SAF-RC-232 100-IU-2 & 100-IU-6 Remaining **Waste Sites – Soil Full Protocol** FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Kathy Wendt H4-21

KW 10/28/13 INITIAL/DATE

COMMENTS:

SDG XP0015 SAF-RC-232

Sample Location: 600-373

Date:

28 October 2013

To:

Washington Closure Hanford Inc. (technical representative)

From:

ELR Consulting

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-373

Subject:

Diesel Range Organics - Data Package No. XP0015-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0015 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1RW08	9/23/13	Soil	С	See note 1
J1RW09	9/23/13	Soil	С	See note 1

^{1 -} Diesel range organics by NWTPH-d.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

DATA QUALITY OBJECTIVES

Holding Times

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of

compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All duplicate results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for analysis.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. XP0015 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
 data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

DIESEL RANGE ORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0015	REVIEWER: ELR	Project: 600-373	PAGE_1_OF_1
COMMENTS: No qualifiers a	ssigned		

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3 Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: October 2, 2013

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

Client Sample ID: J1RW08

RC-232 Soil

Sample ID:

334065001 SOIL

Matrix: Collect Date:

23-SEP-13 07:10

Receive Date: Collector:

25-SEP-13 Client

Moisture:

7.42%

Corrected"

Client SDG: XP0015

Project: Client ID: WCHN00213

WCHN001

Violento

Parameter	Qualifier	Result	DL	RL	Uni	its DF	Analyst Date	Time Batch	Method
Diesel Range Organi	cs								·····
SW 3541/NWTPH-D	Ox in Soil "Dry '	Weight Corrected"							
Diesel Range Organics (C		2340	2340	7200	ug/k	g l	BYT1 10/01/13	1340 1334412	1
Motor Oil (C20-C36)	В	46500	2340	7200	ug/k	g 1			
The following Prep N	Methods were po	erformed:							
Method	Description)		Analyst	Date	Tir	ne Prep Batcl	1	
SW846 3541	3541 DRO IN	SOIL PREP		VSG1	09/27/1	13 113	0 1334411		
The following Analy	ytical Methods v	vere performed:							
Method	Description					Analyst C	omments		
1	NWTPH-Dx i	n Soil							
Surrogate/Tracer Rec	covery Test				Result	Nominal	Recovery%	Acceptable L	imits
o-Terphenyl	SW 354	I/NWTPH-Dx in Soil "Dry Weigh	t		579 ug/kg	720	80.4	(50%-150%	·)

Notes:

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: October 2, 2013

Company: Address:

WC-Hanford, Inc. 2620 Fermi Ávenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

23-SEP-13 07:15

Client Sample ID: J1RW09 Sample ID:

334065002

Matrix:

SOIL

Collect Date: Receive Date:

25-SEP-13 Client

Collector: Moisture:

7.78%

Client SDG: XP0015

Project: Client ID:

WCHN00213 WCHN001

Violala

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst Date	Time Batch	Method
Diesel Range Organi	cs								
SW 3541/NWTPH-D	x in Soil "Dry	Weight Corrected"							
Diesel Range Organics (C	10-C20) J	2570	2350	7220	ug/kg	g 1	BYT1 10/01/13	1419 1334412	į.
Motor Oil (C20-C36)	В	38100	2350	7220	ug/kg	g 1			
The following Prep N	Methods were p	erformed:							
Method	Description	n		Analyst	Date	Tim	e Prep Batch)	
SW846 3541	3541 DRO IN	SOIL PREP		VSG1	09/27/1	3 1130	1334411		
The following Analy	tical Methods v	were performed:							
Method	Description	1				Analyst Co	mments		
1	NWTPH-Dx	n Soil							
Surrogate/Tracer Rec	covery Test				Result	Nominal	Recovery%	Acceptable L	imits
o-Terphenyl	SW 354	11/NWTPH-Dx in Soil "Dry Weigh	ıt		654 ug/kg	722	90.6	(50%-150%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

FID Diesel Range Organics WC-HANFORD, INC. (WCHN) SDG XP0015

Method/Analysis Information

Procedure: Analysis of Diesel Range Organics by Flame Ionization Detector

Analytical Method: NWTPH-Dx in Soil

Prep Method: SW846 3541

Analytical Batch Number: 1334412

Prep Batch Number: 1334411

Sample Analysis

The following samples were analyzed using the analytical protocol as established in NWTPH-Dx in Soil:

Client ID
J1RW08
J1RW09
Method Blank (MB)
Laboratory Control Sample (LCS)
334065002(J1RW09) Matrix Spike (MS)
334065002(J1RW09) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-003 REV# 24.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standards (ICV or CCV) met the acceptance criteria for target analytes. Analyte peaks eluted within the established retention time windows for this method.

Surrogate recovery did not meet the acceptance criteria in one of the standards analyzed for this SDG; however, this had no adverse effects on the data as the surrogate recovery was well within the acceptance range in the samples associated with this SDG.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria; however, the MB was detected with low level (below the PQL) of Motor Oil range hydrocarbons.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 334065002 (J1RW09) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recovery was within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Analyte peaks eluted within the established retention time windows for this method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Electronic Package Comment

This package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative.

Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this SDG in this batch.

Manual Integrations

Manual integration was required for surrogates.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The additional comments were not required.

System Configuration

The Diesel Range Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.I	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

334065

Washington Closure Hanford CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST RC-232-051 Page 1 of 1															
							E ANA	LYS	ilS	REQU	EST	RC-2:			
Collector Company Contact Telephor											Turnaround				
AJ DURNUM	Joan Kessner 375-468 Sampling Location							KESSNER, JH				N			
Project Designation 100-IU-2 & 100-IU-6 Remark				SA	NF No. RC-232		*			15 Days					
Ice Chest No.	COA			140	ethod of Shipm	ent									
WCH-11-	014	1	.ogboo 1666-6			0603732	2000		""	Commerical		- fed	ZV		
Shipped To	<u>UI</u>		Prope	rby No.					Bi	ill of Lading/Air	Biji No.				
GEL Laboratories, LLC				* A120	953						See	OS P	0		
Other Labs Shipped To	1		T		<u> </u>	T	T	I		T. T					
Α.	1/10		1	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4	4C				1		1
/V	114			rieservaudn		 				 			 	┧	-
`	[''	· · · · · · · · · · · · · · · · · · ·	Ту	pe of Container	G/P	#G	a-G	aG						<u> </u>	
POSSIBLE SAMPLE HAZ	'ARDS/REMARKS		No.	of Container(s)	1	1	1 1	1							
None				Volume	125mL	125mL	125mL	125ml	ıL						
			1												
Special Handling and/or	Storage				See item (1) in	TPH-Diesei								ł	
Cool 4C	-		Sa	imple Analysis	Special Instructions	Range - WTPH-0 +	PAHs - 8310	PC8s - 6s	9082				į		
					Wish octions	WITH-OT				i i			İ	l	
0		C	<u></u>	6		.,	 			 				 	
Sample No.	Matrix	Sample Date	•	Sample Time				1 - 3		<u> </u>		3 3 3 4 4 7	<u> </u>	 	
J1RW08	SOIL	9-23-1	3	0710	Х	×	X	Y		<u> </u>				<u> </u>	-
J1RW09	SOIL	9-23-1	3	0715	*	χ	X	· 🗸							
										1					
						1									
							<u> </u>			1				1	
CHAIN OF PO	SEESSION			gn/Print Names	<u> </u>	ISDEC	I INSTRU	ICTIONS	_	<u> </u>			L	<u> </u>	<u> </u>
Religquished By/Removed From	W Date/Time 0770	Received By/Store	· · · · · · · · · · · · · · · · · · ·	Date/Time	0720	(1)1	CP Metals - 60	10TR (C)	lose	-out List) (Alumi	inum, Anti	imony, Arsenic,	Barium, Bery	ilium. Boron	Cadmium.
former Juneur of	9-25-13	MAR.	۔ م	a A Roda	L 9.23	Cale	ium Chromius	n Cohalt	C0	pper, Iron, Lead m, Vanadium, Z	i. Maones	ium. Manganes	e Molybdeni	ım, Nickel, F	otassium.
Relinquished By/Removed From	Date/Time 1624	Received By/Store	d'in	Date/Time	16:24	Ser	enuni, Siecon,	Silver, 30	Julian	in, vanaurum, 4	meg, mere	A) - / - (O)	r) (mercery)		
YN Barlie MAR	13								*						
Relinquished By/Removed From	ham Date/Time		_								_				
Charlal (M)	09-23-13 11 0 Date/Time	1630	<u></u>												
Cigna Bryram	23-13 1438	Received By/Stofe	Hel	le fordse It	9-23	343							PREV	NEWED	1
Relinquished By Removed From	14 Data/Time 1020	Received By/Sign	12	in Date/Time									ed vise	ri-€	
Relieurished By/Removed Front Date/Time Received By/Stored in Date/Time													\ a	24.13	/
Charle With 9-24-13 1025 Fed EX Housefully Company Date Time Professed By/Stored Tron Date Time					clas										′
- Designation of Light	Training using By Removed From Date Time Resided By Spring Th (1) 100 100 100 100 100 100 100 100 100 1								_						
FINAL SAMPLE Disposal Methods DISPOSITION	rod	Dispo	sed By	Date/T	ime		XP	001	5						
WCH EE 011															

Appendix 5 Data Validation Supporting Documentation

PROJECT: 600-373 LAB: CAC DATE: 10027(13) VALIDATOR: EUR LAB: CAC DATE: 10027(13) SDG: POOLS ANALYSES PERFORMED 8015 8021 8141 8151 8315 WTPH-HCID WTPH-G WTPH-D SAMPLES/MATRIX: J(RWOY J(RWOY) 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes (National verification documentation present) 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes Natural Continuing Calibrations acceptable? Yes Natural Calibrations acceptable?	VALIDATION LEVEL:	A	В	(c)	D	E
SDG: X POOLS ANALYSES PERFORMED 8015 8021 8141 8151 8315 WTPH-HCID WTPH-G WTPH-D SAMPLES/MATRIX: J(Rwor J(Rwor) 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Name to the complete state of the complete state	PROJECT:	200-375		DATA PACKAG		
ANALYSES PERFORMED 8015 8021 8141 8151 8315 WTPH-HCID WTPH-G WTPH-D SAMPLES/MATRIX: J(Rwor J(Rwor) 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Name to the complete of the complete	VALIDATOR:	ELR	LAB: Coe			
ANALYSES PERFORMED 8015 8021 8141 8151 8315 WTPH-HCID WTPH-G WTPH-D SAMPLES/MATRIX: J(Rwor J(Rwor) 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Name to the complete of the complete				SDG: XP	0015	
SAMPLES/MATRIX: J(RWOX J(RWOX) 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired?			ANALYSES I	C		
SAMPLES/MATRIX: J(RWOY) Soll 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Comments: 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards traceable? Yes N	8015	8021	8141	8151	8315	
J(RWOY J(RWOY Social 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Comments: 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N			WTPH-HCID	WTPH-G	WTPH-D	
J(RWOY J(RWOY Socious						
J(RWOY J(RWOY Social 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Comments: 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N	SAMPLES/MAT	TRIX.	1	<u> </u>		
2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N			101005			
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Norman Standards expired?	JINW	04 0	(1000)			
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Norman Standards expired?						
1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Norman Standards expired?				, , , , , , , , , , , , , , , , , , , ,		
I. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE Technical verification documentation present? Yes Norman Standards expired? Yes Norman Standards expired? Yes Norman Standards raceable? Yes Norman Standards raceable? Yes Norman Standards raceable? Yes Norman Standards expired? Yes Norman Standards raceable?						3 7 1
Technical verification documentation present? Yes Normalization documents: 2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E) Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N				· · · · · · · · · · · · · · · · · · ·		
Initial calibrations acceptable? Yes N Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N	Technical verifica	tion documentation	present?			Yes No N
Continuing calibrations acceptable? Yes N Standards traceable? Yes N Standards expired? Yes N						Yes No N
Standards traceable? Yes N Standards expired? Yes N						1
Standards expired?Yes N						1
Coloulation shock accountable?						1
Calculation check acceptable?	Calculation check	acceptable?		•••••		Yes No N
Comments:	Comments:					

3. BLANKS (Levels B, C, D, and E)	
Calibration blanks analyzed? (Levels D, E)	Yes No W/2
Calibration blank results acceptable? (Levels D, E)	No N/A
Laboratory blanks analyzed?	No N/A
Laboratory blank results acceptable?	Yes No N/A
Field/trip blanks analyzed? (Levels C, D, E)	Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E)	Yes No(N/A)
Transcription/calculation errors? (Levels D, E)	* `
Comments:	nfg
4. ACCURACY (Levels C, D, and E)	
Surrogates/system monitoring compounds analyzed?	(ye) No N/A
Surrogate/system monitoring compound recoveries acceptable?	/ \
Surrogates traceable? (Levels D, E)	
Surrogates expired? (Levels D, E)	~~~
MS/MSD samples analyzed?	_
MS/MSD results acceptable?	X X
MS/MSD standards NIST traceable? (Levels D, E)	Yes No (N/A
MS/MSD standards expired? (Levels D, E)	
LCS/BSS samples analyzed?	
LCS/BSS results acceptable?	\sim
Standards traceable? (Levels D, E)	
Standards expired? (Levels D, E)	
Transcription/calculation errors? (Levels D, E)	Yes No (N/A
Performance audit sample(s) analyzed?	
Performance audit sample results acceptable?	
Comments:	
	No Pets

5.	PRECISION (Levels C, D, and E)	
Duplic	cate RPD values acceptable?	No N/A
Duplic	cate results acceptable?	
MS/M	ISD standards NIST traceable? (Levels D, E)	Yes No N/A
MS/M	ISD standards expired? (Levels D, E)	Yes No NA
Field o	duplicate RPD values acceptable?	Yes No (N/A)
Field s	split RPD values acceptable?	Yes No (NA
Transc	cription/calculation errors? (Levels D, E)	Yes No (NA
Comm	nents:	
		
		,
6.	HOLDING TIMES (all levels)	
	les properly preserved?	1 1
Samp	le holding times acceptable?	Yes No N/A
Comn	nents:	

8. COM	MPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all		
levels)			
	ted for an requested analyses:	No	
Results suppo	orted in the raw data? (Levels D, E)Yes	No (类
Samples prop	perly prepared? (Levels D, E)	No	N
Detection lim	its meet RDL?Yes	No	N/A
Transcription	/calculation errors? (Levels D, E)Yes	No (NA
Comments:			<u> </u>
			, <u></u>
9. SAN	MPLE CLEANUP (Levels D and E)		~
	or other aborbant) cleanup performed?Yes	Ng	N/A
	rformed?Yes		N/A
Check recove	eries aceptable?Yes	No	N/A
	ials traceable?		
	ials Expired?Yes		
Analytical ba	atch QC given similar cleanup?Yes	No	N/A
	n/Calculation Errors?		
Comments:_			<u></u>
	·		
			<u></u>

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC 2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: October 2, 2013

Page 1 of 2

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder: 334065

Client SDG: XP0015

Project Description: RC-232 Soil

Workorder: 334065 Client SDG: XP0015 Project Description: F					tion: RC-2	32 3011				
	NOM			Qual	QC	Units	RPD%	REC%	Range Anl	t Date Time
LCS nics (C10-C20)	66600				57500	ug/kg		86.4	(70%-130%) BY	TTI 10/01/13 13:01
6)	66600			В	58400	ug/kg		87.7	(70%-130%)	
	666				624	ug/kg		93.6	(50%-150%)	
MB nics (C10-C20)				U	2170	ug/kg				10/01/13 12:22
36)				j	2210	ug/kg				
	667				643	ug/kg		96.4	(50%-150%)	
	72300	J	2570		63300	ug/kg		84	(70%-130%)	10/01/13 14:58
36)	72300	В	38100	В	99700	ug/kg		85.3	(70%-130%)	
	723		654		568	ug/kg		78.6	(50%-150%)	
	72300	J	2570		61200	ug/kg	3.36	81.1	(0%-20%)	10/01/13 15:37
36)	72300	В	38100	В	100000	ug/kg	0.599	86.1	(0%-20%)	
	723		654		546	ug/kg		75.5	(50%-150%)	
	MB nics (C10-C20) 36) 334065002 MS nics (C10-C20)	NOM 14412 1.CS 1.CS 1.CS 1.CS 1.CS 1.CS 1.CS 1.CS	NOM 1412 1.CS nics (C10-C20) 66600 66) 66600 666 MB nics (C10-C20) 667 334065002 MS nics (C10-C20) 72300 J 334065002 MSD anics (C10-C20) 72300 J 334065002 MSD anics (C10-C20) 72300 J 336) 72300 B	NOM Sample 14412 1 LCS 1 (C10-C20) 66600 66) 66600 666 MB 10105 (C10-C20) 667 334065002 MS 10105 (C10-C20) 72300 J 2570 36) 72300 B 38100 723 654 334065002 MSD 2570 36) 72300 B 38100 723 654	NOM Sample Qual 25 4412 4.CS nics (C10-C20) 66600 6) 66600 B 666 MB nics (C10-C20) U 36) 72300 J 2570 334065002 MS nics (C10-C20) T2300 J 2570 36) 72300 B 38100 B 334065002 MSD anics (C10-C20) 72300 J 2570 36) 72300 B 38100 B	NOM Sample Qual QC 14412 1 LCS nics (C10-C20) 66600 57500 6) 66600 B 58400 666 624 MB nics (C10-C20) U 2170 36) J 2210 667 643 334065002 MS nics (C10-C20) 72300 J 2570 63300 723 654 568 334065002 MSD anics (C10-C20) 72300 J 2570 61200 36) 72300 B 38100 B 100000	NOM Sample Qual QC Units cs 4412 LCS 57500 ug/kg hics (C10-C20) 66600 B 58400 ug/kg 60 666 624 ug/kg MB nics (C10-C20) U 2170 ug/kg 360 J 2210 ug/kg 334065002 MS nics (C10-C20) 72300 J 2570 63300 ug/kg 334065002 MS nics (C10-C20) 72300 B 38100 B 99700 ug/kg 334065002 MSD nics (C10-C20) 72300 J 2570 61200 ug/kg 334065002 MSD nics (C10-C20) 72300 B 38100 B 100000 ug/kg	NOM Sample Qual QC Units RPD% 1	NOM Sample Qual QC Units RPD% REC% cs 4412 LCS nics (C10-C20) 66600 57500 ug/kg 86.4 6) 66600 B 58400 ug/kg 87.7 666 624 ug/kg 93.6 MB nics (C10-C20) U 2170 ug/kg 36) J 2210 ug/kg 334065002 MS nics (C10-C20) 72300 J 2570 63300 ug/kg 84 36) 72300 B 38100 B 99700 ug/kg 85.3 723 654 568 ug/kg 78.6 334065002 MSD anics (C10-C20) 72300 J 2570 61200 ug/kg 3.36 81.1 36) 72300 B 38100 B 100000 ug/kg 0.599 86.1	NOM Sample Qual QC Units RPD% REC% Range Anhers 4412 LCS nics (C10-C20) 66600

Notes:

The Qualifiers in this report are defined as follows:

- The TIC is a suspected aldol-condensation product Α
- The analyte was detected in both the associated QC blank and in the sample. В
- Analyte has been confirmed by GC/MS analysis С
- Results are reported from a diluted aliquot of sample. D
- Concentration exceeds the calibration range of the instrument E
- The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated

Date:

28 October 2013

To:

Washington Closure Hanford Inc. (technical representative)

From:

ELR Consulting

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil Full Protocol - Waste Site

600-373

Subject:

Inorganic - Data Package No. XP0015-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0015 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample Date	Media	Validation	Analyte						
9/23/13	Soil	С	See note 1						
	Soil	C	See note 1						
	9/23/13	9/23/13 Soil	June 10 2 2 3 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						

^{1 –} Metals by 7471B & mercury by 7471B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Documentation Requested by Client

DATA QUALITY PARAMETERS

Holding Times

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals and 28 days for mercury.

All holding times were acceptable.

Preparation (Method) Blanks

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "UJ". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

Field (Equipment) Blank

No field blanks were submitted for analysis.

· Accuracy

Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 75% to 125%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 74% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 125% and a sample result less than the IDL, no qualification is required.

Due to matrix spike recoveries outside QC limits, all silicon (25.2%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable,

Precision

Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All laboratory duplicate results were acceptable.

Field Duplicate

No field duplicates were submitted for analysis.

Analytical Detection Levels

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. All results met the RQL.

Completeness

Data package No. XP0015 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

• Due to matrix spike recoveries outside QC limits, all silicon (25.2%) results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All

other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
 data may not be valid for some specific applications (i.e., usable for
 decision-making purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

INORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0015	REVIEWER: ELR	Project: 600-373	PAGE_1_OF_1		
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON		
Silicon	J	All	MS recovery		

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: October 8, 2013

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Project:

RC-232 Soil

Client Sample ID: J1RW08

334065001

Sample ID:

Matrix: Collect Date: SOIL 23-SEP-13 07:10

Receive Date: Collector:

Moisture:

25-SEP-13 Client

7.42%

Client SDG: XP0015

Project: Client ID: WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analy	st Date	Tin	ne Batch	Method
Mercury Analysis-	CVAA										
SW846 7471B Me	rcury in Solid "Dry	Weight Correct	ed"								
Mercury	່ ບໍ	0.00425	0.00425	0.0127	mg/kg	- 1	NOR1	09/27/13	1147	1334136	1
Metals Analysis-IC	CP										
ICP METALS 601		t "Dry Weight C	orrected"								
Aluminum		6650	6.94	20.4	mg/kg	1	HSC	09/27/13	2159	1333881	2
Arsenic	M	35.9	0.510	3.06	mg/kg	1					
Barium		72.5	0.102	0.510	mg/kg	1					
Beryllium		0.594	0.102	0.510	mg/kg	1					
Boron	В	1.51	1.02	5.10	mg/kg	1					
Cadmium	8	0.289	0.102	0.510	mg/kg	1					
Calcium		3230	8.17	25.5	mg/kg	ı					
Chromium		11.5	0.153	0.510	mg/kg	1					
Copper		12.4	0.306	1.02	mg/kg	1					
Iron		19600	8.17	25.5	mg/kg	1					
Magnesium		4100	8.68	30.6	mg/kg	1					
Manganese		309	0.204	1.02	mg/kg	1					
Molybdenum	В	0.406	0.204	1.02	mg/kg	1					
Nickel		10.1	0.153	0.510	mg/kg	l					
Potassium	*N -	1600	6.53	25.5	mg/kg	1					
Silicon	*MN ∠	533	1.53	10.2	mg/kg	1					
Silver	В	0.316	0.102	0.510	mg/kg	1					
Sodium		87.2	7.15	25.5	mg/kg	1					
Lead		96.8	0.337	1.02	mg/kg	1	JWJ	10/02/13	1058	1333881	3
Antimony	DU	1.68	1.68	5.10	mg/kg	5	HSC	10/02/13	1130	1333881	4
Cobalt	D	7.46	0.766	2.55	mg/kg	5					
Vanadium	D	52.6	0.510	2.55	mg/kg	5					
Zinc	D	44.9	2.04	5.10	mg/kg	5					
Metals Analysis-IC	CP-MS										
SW846 3050B/602	20A Selenium "Dry	Weight Correct	ed"								
Selenium	DU	0.343	0.343	1.04	mg/kg	2	SKJ	09/30/13	2048	1333879	5
The following Pres	p Methods were per	rformed:									
Method	Description		,	Analyst	Date	Tim	ie P	rep Batch	1		
SW846 3050B	ICP-MS 3050F			AXG2	09/27/13	0800		333876			
SW846 3050B	SW846 3050B	Pren for 6010C		AXG2	09/27/13	0800	1.	333880			

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	AXG2	09/27/13	0800	1333876
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	09/27/13	0800	1333880
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	09/26/13	1649	1334135

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: October 8, 2013

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact: Project:

Joan Kessner

RC-232 Soil

Client Sample ID: J1RW09

Sample ID:

334065002

Matrix: Collect Date: SOIL 23-SEP-13 07:15

Receive Date:

25-SEP-13 Client

Collector: Moisture:

7.78%

Client SDG: XP0015

Project: Client ID: WCHN00213

WCHN001

Violalis

Parameter	Qualifier	Result	DL	RL	Units	DF An	alyst Date	Time Batch	Method
Mercury Analysis-CV	AA								
SW846 7471B Mercur	y in Solid "Dr	y Weight Cor	rected"						
Mercury	U	0.00396	0.00396	0.0118	mg/kg	i NC	RI 09/27/13	1154 1334136	l
Metals Analysis-ICP									
ICP METALS 6010TF	Close-out Lis	at "Dry Weigh	nt Corrected"						
Aluminum		6630	7.09	20.9	mg/kg	i HS	C 09/27/13	2211 1333881	2
Arsenic	М	65.7	0.521	3.13	mg/kg	1			
Barium		76.2	0.104	0.521	mg/kg	I			
Beryllium		0.594	0.104	0.521	mg/kg	i			
Boron	В	1.74	1.04	5.21	mg/kg	1			
Cadmium	В	0.354	0.104	0.521	mg/kg	1			
Calcium		3340	8.34	26.1	mg/kg	i			
Chromium		12.8	0.156	0.521	mg/kg	1			
Copper		12.7	0.313	1.04	mg/kg	1			
Iron		20100	8.34	26.1	mg/kg	l			
Magnesium		4150	8.86	31.3	mg/kg	1			
Manganese		317	0.209	1.04	mg/kg	1			
Molybdenum	В	0.566	0.209	1.04	mg/kg	1			
Nickel		10.6	0.156	0.521	mg/kg	1			
Potassium	*N	1700	6.67	26.1	mg/kg	1			
Silicon	*MN	458	1.56	10.4	mg/kg	1			
Silver	В	0.154	0.104	0.521	mg/kg	l			
Sodium		90.3	7.30	26.1	mg/kg	!		1222001	•
Lead		322	0.344	1.04	mg/kg	1 JW		1113 1333881	3 4
Antimony	DU	1.72	1.72	5.21	mg/kg	5 HS	C 10/02/13	1142 1333881	4
Cobalt	D	7.25	0.782	2.61	mg/kg	5			
Vanadium	D	52.7	0.521	2.61	mg/kg	5			
Zinc	D	50.6	2.09	5.21	mg/kg	5			
Metals Analysis-ICP-I	MS								
SW846 3050B/6020A	Selenium "Dr	y Weight Cor	rrected"						_
Selenium	DU	0.341	0.341	1.03	mg/kg	2 SK	J 09/30/13	2135 1333879	5
The following Prep M	lethods were p	erformed:							
Method	Descriptio			Analyst	Date	Time	Prep Batc	<u>h</u>	
SW846 3050B	ICP-MS 3050	BS PREP		AXG2	09/27/13	0800	1333876		
SW846 3050B	SW846 3050	B Prep for 60100	C	AXG2	09/27/13	0800	1333880		
SW846 7471B Prep	SW846 7471	B Mercury Prep	Soil	AXS5	09/26/13	1649	1334135		

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Metals Fractional Narrative WC-HANFORD, INC. (WCHN) SDG XP0015

Sample Analysis

Sample ID	Client ID
334065001	J1RW08
334065002	J1RW09
1202954622	Method Blank (MB) ICP
1202954623	Laboratory Control Sample (LCS)
1202954626	334065001(J1RW08L) Serial Dilution (SD)
1202954624	334065001(J1RW08D) Sample Duplicate (DUP)
1202954625	334065001(J1RW08S) Matrix Spike (MS)
1202958834	334065001(J1RW08PS) Post Spike (PS)
1202954605	Method Blank (MB) ICP-MS
1202954606	Laboratory Control Sample (LCS)
1202954609	334065001(J1RW08L) Serial Dilution (SD)
1202954607	334065001(J1RW08D) Sample Duplicate (DUP)
1202954608	334065001(J1RW08S) Matrix Spike (MS)
1202955261	Method Blank (MB) CVAA
1202955262	Laboratory Control Sample (LCS)
1202955265	334065001(J1RW08L) Serial Dilution (SD)
1202955263	334065001(J1RW08D) Sample Duplicate (DUP)
1202955264	334065001(J1RW08S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Method/Analysis Information

Analytical Batch:	1333881, 1333879 and 1334136
Prep Batch:	1333880, 1333876 and 1334135

Standard Operating GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-

Procedures: 014 REV# 25 and GL-MA-E-010 REV# 26

Analytical Method: SW846 3050B/6010C, SW846 3050B/6020A and SW846

7471B

Prep Method:

SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis - ICPMS was performed on a Perkin Elmer ELAN 6100E inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1400W power and combined argon pressures of 3607 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

Calibration Information

Instrument Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

CRDL Requirements

All CRDL standards met the advisory control limits with the exceptions of potassium, sodium, and antimony for samples 334065001 (J1RW08) and 334065002 (J1RW09). The PQL recovered high for potassium and antimony and low for sodium. The samples were 2x greater than the PQL for potassium and sodium but less than the MDL for antimony. The data is not adversely affected.

ICSA/ICSAB Statement

All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

Continuing Calibration Blank (CCB) Requirements

All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements

All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement

The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement

The following samples were selected as the quality control (QC) samples for this SDG: 334065001 (J1RW08)-ICP, ICP-MS and CVAA.

Matrix Spike (MS) Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria, with the exception of potassium and silicon, as indicated by the "N" qualifiers.

Duplicate Relative Percent Difference (RPD) Statement

The relative percent difference (RPD) obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required reporting limit (RL). In cases where either the sample or duplicate value is less than 5X the contract required detection limit (RL), a control of RL is used to evaluate the DUP results. All applicable analytes met these requirements, with the exception of potassium and silicon, as indicated by the "*" qualifiers.

Post Spike (PS) Recovery Statement

The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS did not meet the recommended quality control acceptance criteria for the percent recoveries for silicon and verifies the presence of matrix interferences.

Serial Dilution % Difference Statement

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 25x the IDL/MDL for CVAA, 50X the IDL/MDL for ICP and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the established criteria of less than 10% difference (%D), with the exception of arsenic and silicon, as indicated by the "M" qualifiers.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions

Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 334065001 (J1RW08) and 334065002 (J1RW09) required 5x dilutions in order to bring titanium raw values within the linear range of the instrument, and antimony, cobalt, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid. Samples in this SDG were diluted the standard 2x for solids on the ICPMS.

Preparation Information

The samples in this SDG were prepared exactly according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment

This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has

developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation

Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1227532. A copy is included in the Miscellaneous Data section of this package.

Additional Comments

Additional comments were not required for this SDG.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

		10	
Reviewer:	Date:	10	

DER Report No.: 1227532 Revision No.: 3

DATA EXCEPTION REPORT Mo.Day Yr. Division: **Quality Criteria:** Type: Process 02-OCT-13 Industrial Specifications Test / Method: SW846 3050B/6010C Instrument Type: Matrix Type: **Client Code:** Batch ID: Sample Numbers: 1333881 See Below Potentially affected work order(s)(SDG): 334065(XP0015),334067(XP0016),334070(XP0017),334072(XP0018),334074(XP0019) Application Issues: Failed Recovery for MS/PS Failed RPD for DUP Other Specification and Requirements **DER Disposition: Exception Description:** 1. Failed Recovery for MS/PS: 1. The matrix spike recovery failed outside of the control limits for potassium, silicon, barium and copper. The post spike failed outside the 1202954625MS,1202954628MS, required control limits for silicon and barium but passed for all other analytes. This verifies the presence of a matrix interference for silicon and 1202954631MS, barium and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is 1202954634MS, not required and the data is qualified and reported. 1202954637MS, 2. The sample and sample duplicate % RPD failed outside the control limits for potassium, silicon, manganese, zinc, cadmium and calcium due to 1202958834PS, possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the 1202958835PS, data is qualified and reported. 1202958836PS, 3. The samples were analyzed on 3 separate passing calibrations. The closing PQL recovered high for antimony in all 3 analyses due to possible matrix interactions. Sample #334074002 was the only one not less than 1202958837PS, the MDL or 2x greater than the PQL. The data is being reported. 1202958838PS 2. Failed RPD for DUP: 1202954624DUP, 1202954627DUP, 1202954630DUP. 1202954633DUP, 1202954636DUP

Originator's Name:

Helen Camello

02-OCT-13

3. Low level PQL recovered high for antimony.

Data Validator/Group Leader:

Jerry Wigfall

02-OCT-13

Washington Closure Hanford		ord CHA	AIN OF CUST	TODY/S	AMPL	E ANA	LYS	IS REQUE	EST	RC-23	2-051	Page	of 1
Collector			ny Contact n Kessner		phone No. -4688			Project Coordinat KESSNER, JI		Price Code	8C _B	_	urnaround
Project Designation			ng Location		7000			SAF No.			مير 5	E 1-19-137	5 Days
100-IU-2 & 100-IU-6 Rema	aining Waste Sites	600	373					RC-232				1 '	Juays
Ice Chest No. WCH -11-	all	1	ogbook No. 1666-01		OA 0603732	2000		Method of Shipme Commerical C		-fed	<i>5</i> \/		
Shipped To	017		Property No.		0003732	:000		Bill of Lading/Air			CX_		
GEL Laboratories, LLC		A120	953					See	OS P	0			
Other Labs Shipped To			Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 40						
	MA		Type of Container	G/P	aG	aG	aG						
POSSIBLE SAMPLE HAZ	ARDS/REMARKS		No. of Container(s)	1	1	1	1						
None			Volume	125mL	125mL	125mL	125mL						
Special Handling and/or S	Storage		Sample Analysis	See item (1) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	PCBs - 80	982					
Sample No.	Matrix	Sample Date	Sample Time					11.1 44.1			- 25.00	: .	
J1RW08	SOIL	9-23-1	3 0710	×	×	×	¥						
J1RW09	SOIL	9-23-1	3 0715	*	Υ	Х	Y						
								_					
CHAIN OF PO	SSESSION		Sign/Print Names	· · · · · · · · · · · · · · · · · · ·	SPEC	IAL INSTRU	ICTIONS	;			···		•
Relipquished By/Removed From	Date/Time 0770	Received By/Store	d in Date/Time	0720	(1) I	CP Metals - 60)10TR (Ck	ose-out List) (Alumir Copper, Iron, Lead,	num, Ani Magne	imony, Arsenic, E sium, Manganese	Barium, Berylle, Molybdenur	ium, Boron, (n, Nickel, Po	Cadmium, lassium,
Relinquished By/Removed Frogr	Date/Time (624	Received By/Store	IN MARAMAEN	16:24				dium, Vanadium, Zir					
	amberger 9-23.	3 CHARHAC	- extall	9-23-	13								İ
Relinquished ByTRemoved From Chas Ital Matte	20 0-23.2	1 -7/1-2	3ingham Date Time	11030									
Clipping Bythemover of one	Date/Time 23-13 1438	Received By/Store	Helle for der 1	9 9-23	38						FREV	EWED \	\
Reinquisted By Rymoved From 14 Date/Time 1020 Received By Store 1000 Battell France 9-24-13			d in BelterTime	1020							1	ed vice	4 €
Relinquished By/Removed Front Date/Time Received By/Store								-			9-2	ATE 4.13	/
Relinquished By/Removed From	Fedool	By		ton	n								
FINAL SAMPLE Disposal Neth	Time		XP	001	5								

Appendix 5

Data Validation Supporting Documentation

<u>V</u> ALIDATION LEVEL:	A	В	(c)	D	Е	
PROJECT: (200-373		DATA PACKAGI	: XP001	ک	
VALIDATOR:	PLR	LAB: Cae		DATE: /0/	27/13	
			SDG: 💢	POUIS		
	`	ANALYSES I	PERFORMED			
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide			
SAMPLES/MA	TRIX			, , , ,		
Jiru	004 DIR	-W09				
<u> </u>		West Prof. William I and a second				

				,	es 1	
	PACKAGE COMPI				80.1	
	PACKAGE COMPI) N/A
Technical verifica	ation documentation) N/#
Technical verifica Comments: 2. INSTRU	JMENT PERFORM	present?	JBRATIONS (Lev	els D and E)	Yes N	
Technical verifica Comments: 2. INSTRU Initial calibrations	JMENT PERFORM	AANCE AND CAL	IBRATIONS (Lev	els D and E)	Yes N	
Comments: 2. INSTRU Initial calibrations	JMENT PERFORM s performed on all in	/ANCE AND CAL struments?	JBRATIONS (Lev	els D and E)	Yes NoYes No	o N/A
Comments: 2. INSTRU Initial calibrations Initial calibrations ICP interference of	JMENT PERFORM s performed on all in s acceptable?	AANCE AND CAL	IBRATIONS (Lev	els D and E)	Yes NoYes NoYes NoYes NoYes No	o N/A
2. INSTRU Initial calibrations ICP interference of ICV and CCV che	JMENT PERFORM s performed on all in s acceptable? checks acceptable?	AANCE AND CAL struments?	JBRATIONS (Lev	els D and E)	Yes NoYes No	o N/A o N/A o N/A
2. INSTRU Initial calibrations ICP interference of ICV and CCV chellicv an	JMENT PERFORM s performed on all in s acceptable? checks acceptable? ecks performed on all ecks acceptable?	AANCE AND CAL struments?	IBRATIONS (Lev	els D and E)	Yes NoYes No	0 N/A 0 N/A 0 N/A 0 N/A
2. INSTRU Initial calibrations ICP interference of ICV and CCV che ICV and CCV che Standards traceab	JMENT PERFORM s performed on all in s acceptable? checks acceptable? ecks performed on all ecks acceptable?	AANCE AND CAL struments?	JBRATIONS (Lev	els D and E)	Yes NoYes No	0 N/A 0 N/A 0 N/A 0 N/A 0 N/A
2. INSTRU Initial calibrations ICP interference of ICV and CCV che ICV and CCV che Standards traceab Standards expired	JMENT PERFORM s performed on all in s acceptable? checks acceptable? ecks performed on all ecks acceptable?	AANCE AND CAL struments?	IBRATIONS (Lev	els D and E)	Yes NYes NYes NYes NYes NYes NYes NYes NYes N	0 N/A 0 N/A 0 N/A 0 N/A 0 N/A 0 N/A

3.	BLANKS (Levels B, C, D, and E)		
ICB an	nd CCB checks performed for all applicable analyses? (Levels	D, E)	Yes No (N/4)
ICB an	nd CCB results acceptable? (Levels D, E)		Yes No N/A
Labora	atory blanks analyzed?		No N/A
Labora	atory blank results acceptable?		Yes No N/A
	planks analyzed? (Levels C, D, E)		
Field b	olank results acceptable? (Levels C, D, E)		Yes No 🐠
Transc	cription/calculation errors? (Levels D, E)		Yes No 🕅 🗚
Comm	ients:	n: FB	
4.	ACCURACY (Levels C, D, and E)		\overline{a}
	(SD samples analyzed?		
	ISD results acceptable?		
MS/M	ISD standards NIST traceable? (Levels D, E)		Yes No NA
MS/M	ISD standards expired? (Levels D, E)		
LCS/E	BSS samples analyzed?		No N/A
LCS/E	BSS results acceptable?		(Yes) No N/A
Standa	ards traceable? (Levels D, E)		Yes No N/A
Standa	ards expired? (Levels D, E)		Yes No N
Transe	cription/calculation errors? (Levels D, E)		Yes No 🚧
Perfor	rmance audit sample(s) analyzed?	···········	Yes(No N/A
Perfor	rmance audit sample results acceptable?		Yes No NA
Comn	nents: MS - 51/11 (25.29)		
		no PA	,)

5. PRECISION (Levels C, D, and E)	
Duplicate RPD values acceptable?	No N/A
Duplicate results acceptable?	Yes) No N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes No
MS/MSD standards expired? (Levels D, E)	Yes No
Field duplicate RPD values acceptable?	Yes No
Field split RPD values acceptable?	Yes No (N/A)
Transcription/calculation errors? (Levels D, E)	Yes No NA
Comments:	
6. ICP QUALITY CONTROL (Levels D and E)	
ICP serial dilution samples analyzed?	Yes No N/A
ICP serial dilution %D values acceptable?	Yes No N/A
ICP post digestion spike required?	Yes No N/A
ICP post digestion spike values acceptable?	Yes No N/A
Standards traceable?	Yes No N/A
Standards expired?	Yes Np N/A
Transcription/calculation errors?	Yes No N/A
Comments:	

7.	FURNACE AA QUALITY CONTROL (Levels D and E)		/	
Duplic	cate injections performed as required?	Yes	(No/	N/A \
Duplio	cate injection %RSD values acceptable?	Yes	No	N/A
Analy	rtical spikes performed as required?	Yes	No	N/A
Analy	vtical spike recoveries acceptable?	Yes	Ng	N/A
Standa	lards traceable?	Yes	Nø	N/A
Stand	dards expired?	Yes	Nb	N/A
MSA	performed as required?	Yes	No	N/A
MCA	results acceptable?	Yes	No	N/A
WISA	scription/calculation errors?	Yes	No	N/A
	ments:			_
8.	HOLDING TIMES (all levels) uples properly preserved?	Yes	, No	N/A
Sam	pple holding times acceptable?		No	N/A
Com	nments:			
		,		

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)	
Results reported for all requested analyses?	Yes No XA
9. RESULT QUANTITATION AND DETECTION LIMITS (all levels) Results reported for all requested analyses? Results supported in the raw data? (Levels D, E) Samples properly prepared? (Levels D, E) Detection limits meet RDL? Transcription/calculation errors? (Levels D, E)	Yes No
Samples properly prepared? (Levels D, E)	Yes No N/A
Detection limits meet RDL?	Yes No 1994
Transcription/calculation errors? (Levels D, E)	Yes No N/A
Comments:	

Appendix 6

Additional Documentation Requested by Client

QC Summary

Report Date: October 8, 2013

Page 1 of 7

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

Workorder:	334065		Client SDG: XP0015 Project Description: RC-232 Soil										
Parmname			NON	1	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anist	Date Time
Metals Analysis - 16 Batch 13	C PMS 33879												
QC1202954607 Selenium	334065001	DUP		DU	0.343	DU	0.315	mg/kg	N/A ^			SKJ	09/30/13 20:54
QC1202954606 Selenium	LCS		4.94			Đ	4.57	mg/kg		92.5	(80%-120%))	09/30/13 20:30
QC1202954605 Selenium	МВ					DU	0.325	mg/kg					09/30/13 20:24
QC1202954608 Selenium	334065001	MS	5.32	DU	0.343	D	4.62	mg/kg		87	(75%-125%)	ŀ	09/30/13 21:00
QC1202954609 Selenium	334065001	SDIL	т	DU	-0.993	DU	1.72	ug/L	N/A		(0%-10%)		09/30/13 21:12
Metals Analysis-IC Batch 13	P 133881												
QC1202954624 Aluminum	334065001	DUP			6650		6880	mg/kg	3.36		(0%-20%)	HSC	09/27/13 22:02
Antimony				DU	1.68	BCD	2.09	mg/kg	32.2 ^		(+/-4.96)	•	10/02/13 11:33
Arsenic				М	35.9		29.8	mg/kg	18.5		(0%-20%)		09/27/13 22:02
Barium					72.5		75.7	mg/kg	4.37		(0%-20%)		
Beryllium					0.594		0.540	mg/kg	9.54 ^		(+/-0.496)	ı	
Boron				В	1.51	U	0.993	mg/kg	51.0 ^		(+/-4.96)	ı	
Cadmium				В	0.289	В	0.239	mg/kg	19.1 ^		(+/-0.496)		
Calcium					3230		2980	mg/kg	8.12		(0%-20%)		
Chromium					11.5		13.9	mg/kg	18.9		(0%-20%)		
Cobalt				D	7.46	D	6.79	mg/kg	9.44 ^		(+/-2.48)		10/02/13 11:33
Copper					12.4		11.1	mg/kg	11.0		(0%-20%)		09/27/13 22:02
Iron					19600		18500	mg/kg	5.89		(0%-20%)		

Page 69 of 82

QC Summary

Workorder: 3	34065	Client SDG: XP0015 Project Description: RC-232 Soil									
Parmname		NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range A	nlst	Page 2 of 7 Date Time
Metals Analysis-ICF Batch 133	33881										
Lead			96.8		84.2	mg/kg	13.9		(0%-20%)	JWJ	10/02/13 11:01
Magnesium			4100		4540	mg/kg	10.1		(0%-20%)	HSC	09/27/13 22:02
Manganese			309		285	mg/kg	8.19		(0%-20%)		
Molybdenum		В	0.406	В	0.497	mg/kg	20.3 ^	·	(+/-0.993)		
Nickel			10.1		10.2	mg/kg	0.201		(0%-20%)		
Potassium		*N	1600	*	1980	mg/kg	20.8*		(0%-20%)		
Silicon		*MN	533	*	422	mg/kg	23.2*		(0%-20%)		
Silver		В	0.316	В	0.367	mg/kg	14.8		(+/-0.496)		
Sodium			87.2		85.8	mg/kg	1.70		(+/-24.8)		
Vanadium		D	52.6	Ð	45.5	mg/kg	14.5		(0%-20%)		10/02/13 11:33
Zinc		D	44.9	D	40.6	mg/kg	10.0		(0%-20%)		
QC1202954623 Aluminum	LCS	469			482	mg/kg		103	(80%-120%)		09/27/13 21:56
Antimony		46.9			47.5	mg/kg		101	(80%-120%)		10/02/13 11:27
Arsenic		46.9			46.8	mg/kg		99.8	(80%-120%)		09/27/13 21:56
Barium		46.9			46.6	mg/kg		99.4	(80%-120%)		
Beryllium		46.9			47.6	mg/kg		101	(80%-120%)		
Boron		46.9			46.1	mg/kg		98.3	(80%-120%)		
Cadmium		46.9			48.3	mg/kg		103	(80%-120%)		
Calcium		469			498	mg/kg		106	(80%-120%)		
Chromium		46.9			45.7	mg/kg		97.4	(80%-120%)		
Cobalt		46.9			47.9	mg/kg		102	(80%-120%)		10/02/13 11:27

QC Summary

	QC Builliar y										
Workorder: 334065	Client SDG: XP0015		Project Description: RC-232 Soil							Page 3 of 7	
Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time	
Metals Analysis-ICP Batch 1333881											
Copper	46.9			47.0	mg/kg		100	(80%-120%)	HSC	09/27/13 21:56	
Iron	469			474	mg/kg		101	(80%-120%)	ı		
Lead	46.9			48.8	mg/kg		104	(80%-120%)	JWJ	10/02/13 10:55	
Magnesium	469			513	mg/kg		109	(80%-120%)	HSC	09/27/13 21:56	
Manganese	46.9			45.8	mg/kg		97.7	(80%-120%))		
Molybdenum	46.9			45.4	mg/kg		96.9	(80%-120%))		
Nickel	46.9			48.1	mg/kg		103	(80%-120%))		
Potassium	469			479	mg/kg		102	(80%-120%)	ı		
Silicon	469			403	mg/kg		86	(80%-120%)			
Silver	46.9			47.8	mg/kg		102	(80%-120%)	ı		
Sodium	469			450	mg/kg		95.9	(80%-120%)			
Vanadium	46.9			47.6	mg/kg		102	(80%-120%)		10/02/13 11:27	
Zinc	46.9			47.9	mg/kg		102	(80%-120%)			
QC1202954622 MB Aluminum			U	6.59	mg/kg					09/27/13 21:53	
Antimony			В	0.534	mg/kg					10/02/13 11:24	
Arsenic			U	0.484	mg/kg					09/27/13 21:53	
Barium			U	0.0969	mg/kg						
Beryllium			U	0.0969	mg/kg						
Boron			U	0.969	mg/kg						
Cadmium			U	0.0969	mg/kg						
Calcium			U	7.75	mg/kg						

Page 71 of 82

QC Summary

Workorder: 334065		XP001:	,	Project Description: RC-232 Soil							Page 4 of 7	
Parmname	NOM		Sample Qu	ual	QC	Units	RPD/D%	REC%	Range	Anist	Date Time	
Metals Analysis-ICP Batch 1333881												
Chromium			υ	J	0.145	mg/kg				нѕс	09/27/13 21:53	
Cobalt			Ĺ	J	0.145	mg/kg					10/02/13 11:24	
Copper			ι	J	0.291	mg/kg					09/27/13 21:53	
Iron ·			ţ	J	7.75	mg/kg						
Lead			τ	J	0.320	mg/kg				JWJ	10/02/13 10:53	
Magnesium			ţ	IJ	8.24	mg/kg				HSC	09/27/13 21:53	
Manganese			Ţ	U	0.194	mg/kg						
Molybdenum			τ	U	0.194	mg/kg						
Nickel			1	В	0.146	mg/kg	}					
Potassium			1	В	6.36	mg/kg						
Silicon			1	U	1.45	mg/kg	;					
Silver			!	U	0.0969	mg/kg	3					
Sodium				U	6.78	mg/kį	3					
Vanadium				U	0.0969	mg/kį	3				10/02/13 11:24	
Zinc				U	0.388	mg/k	3					
QC1202954625 3340650 Aluminum	01 MS 509		6650		9080	mg/k	g	N/A	(75%-1259	%)	09/27/13 22:05	
Antimony	50.9	DU	1.68	D	44.7	mg/k	g	84.8	(75%-1259	%)	10/02/13 11:30	
Arsenic	50.9	М	35.9		84.6	mg/k	g	95.6	(75%-125	%)	09/27/13 22:0:	
Barium	50.9		72.5		123	mg/k	g	98.3	(75%-125	%)		
Beryllium	50.9		0.594		50.6	mg/k	g	98.2	(75%-125	%)		
Boron	50.9	В	1.51		50.3	mg/k	g	95.7	(75%-125	%)		

Page 72 of 82

QC Summary

Workorder: 334065	Client SDC	3: XP001		<u> </u>	Proj	<u>√</u> ect Descrip	otion: RC-2	32 Soil			Page 5 of 7
Parmname	NO	M	Sample	Oual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Batch 1333881					1						
Cadmium	50.9	В	0.289		50.3	mg/kg		98.2	(75%-125%)	HSC	09/27/13 22:05
Calcium	509	1	3230		3880	mg/kg		N/A	(75%-125%))	
Chromium	50.9	ı	11.5		60.7	mg/kg		96.6	(75%-125%))	
Cobalt	50.9	D	7.46	D	58.6	mg/kg		100	(75%-125%))	10/02/13 11:36
Copper	50.9	1	12.4		66.5	mg/kg		106	(75%-125%))	09/27/13 22:05
Iron	509	•	19600		21000	mg/kg		N/A	(75%-125%))	
Lead	50.9)	96.8		136	mg/kg		76.4	(75%-125%)) JWJ	10/02/13 11:03
Magnesium	509)	4100		4890	mg/kg		N/A	(75%-125%)) HSC	09/27/13 22:05
Manganese	50.9	,	309		365	mg/kg		N/A	(75%-125%))	
Molybdenum	50.9	В	0.406		48.5	mg/kg		94.5	(75%-125%))	
Nickel	50.9)	10.1		59.2	mg/kg		96.4	(75%-125%))	
Potassium	509) *N	1600	N	2250	mg/kg		127*	(75%-125%)	
Silicon	509	*MN	533	N	661	mg/kg		25.2*	(75%-125%)	
Silver	50.9	В	0.316		52.1	mg/kg		102	(75%-125%)	
Sodium	509)	87.2		576	mg/kg		96	(75%-125%))	
Vanadium	50.9	D	52.6	D	104	mg/kg		102	(75%-125%))	10/02/13 11:36
Zinc	50.9	D	44.9	D	95.8	mg/kg		99.9	(75%-125%))	
QC1202958834 33406500 Potassium	1 PS 5000) *N	15700	С	21700	ug/L		120	(80%-120%))	10/02/13 13:43
Silicon	5000	*MN	5220		22900	ug/L		354*	(80%-120%))	
QC1202954626 33406500 Aluminum	I SDILT		65200	D	13700	ug/L	4.75		(0%-10%))	09/27/13 22:07
Antimony		שם	2.96	CD	4.40	ug/L	N/A		(0%-10%))	10/02/13 11:39

Page 73 of 82

QC Summary

Workorder:	334065	Client SDG: XP001	15	<u> </u>	Proj		otion: RC-2	32 Soil			Page 6 of 7
Parmname		NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range A	nist	Date Time
Metals Analysis Batch	-ICP 1333881										
Arsenic		М	351	DM	77.4	ug/L	10.2*		(0%-10%)	HSC	09/27/13 22:07
Barium			710	D	147	ug/L	3.65		(0%-10%)		
Beryllium			5.82	D	1.24	ug/L	6.49		(0%-10%)		
Boron		В	14.8	DU	5.10	ug/L	N/A		(0%-10%)		
Cadmium		В	2.84	DU	0.510	ug/L	N/A		(0%-10%)		
Calcium			31700	D	6580	ug/L	3.88		(0%-10%)		
Chromium			112	D	22.5	ug/L	.156		(0%-10%)		
Cobalt		D	14.6	D	3.18	ug/L	8.98		(0%-10%)		10/02/13 11:39
Copper			121	D	23.4	ug/L	3.24		(0%-10%)		09/27/13 22:07
Iron			192000	D	40500	ug/L	5.59		(0%-10%)		
Lead			948	D	189	ug/L	.104		(0%-10%)	JWJ	10/02/13 11:05
Magnesium			40200	D	8370	ug/L	4.21		(0%-10%)	HSC	09/27/13 22:07
Manganese			3030	D	641	ug/L	5.81		(0%-10%)		
Molybdenum		В	3.98	DU	1.02	ug/L	N/A		(0%-10%)		
Nickel			99.3	CD	21.0	ug/L	5.6		(0%-10%)		
Potassium		*N	15700	CD	3360	ug/L	6.76		(0%-10%)		
Silicon		*MN	5220	DM	1190	ug/L	13.7*		(0%-10%)		
Silver		В	3.10	D	1.04	ug/L	67.6		(0%-10%)		
Sodium			854	D	168	ug/L	1.84		(0%-10%)		
Vanadium		D	103	D	20.0	ug/L	3.09		(0%-10%)		10/02/13 11:39
Zinc		D	88.0	D	16.8	ug/L	4.7		(0%-10%)		

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 334065			Client SDG: >	(P001	5	Project Description: RC-232 Soil						
Parmname			NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range Anist	Date Time
Metals Analysis-Me Batch 13	rcury 34136							•				
QC1202955263 Mercury	334065001 [UP		υ	0.00425	В	0.00436	mg/kg	106 ^		(+/-0.0126) NOR1	09/27/13 11:49
QC1202955262 Mercury	LCS		0.119				0.121	mg/kg		102	(80%-120%)	09/27/13 11:46
QC1202955261 Mercury	МВ					В	-0.00457	mg/kg				09/27/13 11:44
QC1202955264 Mercury	334065001	MS	0.126	U	0.00425		0.139	mg/kg	1	109	(80%-120%)	09/27/13 11:51
QC1202955265 Mercury	334065001	SDILT	•	U	0.021	DU	0.0212	ug/L	, N/A		(0%-10%)	09/27/13 11:53

Notes:

The Qualifiers in this report are defined as follows:

- Duplicate analysis not within control limits
- Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). R
- Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration. C
- Results are reported from a diluted aliquot of sample. D
- Reported value is estimated due to interferences. See comment in narrative. Ε
- Duplicate precision not met. M
- Spike Sample recovery is outside control limits. N
- Reported value determined by the Method of Standard Additions (MSA) S
- Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. U
- Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency. w
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier X
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Z

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

- ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
- * Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Date:

28 October 2013

To:

Washington Closure Hanford Inc. (technical representative)

From:

ELR Consulting

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-373

Subject:

PCB - Data Package No. XP0015-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0015 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1RW08	9/23/13	Soil	С	See note 1
J1RW09	9/23/13	Soil	С	See note 1

^{1 -} PCBs by 8082A.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

DATA QUALITY OBJECTIVES

Holding Times

Holding times are not applicable for PCB analysis.

Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in

the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All duplicate results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for analysis.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. XP0015 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

Appendix 1 Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
 data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

PCB DATA QUALIFICATION SUMMARY*

	SDG: XP0015	REVIEWER: ELR	Project: 600-373	PAGE_1_OF_1				
COMMENTS: No qualifiers assigned								

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 30, 2013

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Client SDG: XP0015

Project:

RC-232 Soil

Project: Client ID: WCHN00213 WCHN001

Client Sample ID: J1RW08 Sample ID: Matrix:

334065001

SOIL

Collect Date:

23-SEP-13 07:10

Receive Date:

25-SEP-13 Client

Collector: Moisture:

7.42%

V10/22/13

Parameter	Qualifier	Result	DL	RL	Unit	s DF	Analyst	Date	Time Batch	Method
Semi-Volatiles-PCB										
SW846 3541/8082A	PCB Solid Auto	omated Soxhlet "D	ry Weight Corre	cted"						
Aroclor-1016	U	1.20	1.20	3.59	ug/kg	: 1	YS1 09	7/27/13	1301 1334323	1
Aroclor-1221	U	1.20	1.20	3.59	ug/kg	; 1				
Aroclor-1232	U	1.20	1.20	3.59	ug/kg	; i				
Aroclor-1242	U	1.20	1.20	3.59	ug/kg	; 1				
Aroclor-1248	U	1.20	1.20	3.59	ug/kg	; 1				
Aroclor-1254	U	1.20	1,20	3.59	ug/kg	; 1				
Aroclor-1260	U	1.20	1.20	3.59	ug/kg	; 1				
The following Prep M	lethods were po	erformed:								
Method	Description	n		Analyst	Date	Tim	e Prep	Batch	1	
SW846 3541	Prep Method	3541 PCB Prep Soil		MXS4	09/26/1	3 1730	1334	322		
The following Analy	tical Methods v	vere performed:								
Method	Description					Analyst Co	mments			
1	SW846 3541/	8082A								
Surrogate/Tracer Rec	overy Test				Result	Nominal	Recove	ry%	Acceptable L	imits
4cmx		3541/8082A PCB Soli	d Automated Soxhlet		5.53 ug/kg	7.19	76	.9	(44%-106%)
Decachlorobiphenyl		3541/8082A PCB Soli eight Corrected"	d Automated Soxhlet		5.73 ug/kg	7.19	79	2.7	(35%-119%)

Notes:

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 30, 2013

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Project:

RC-232 Soil

Client Sample ID: J1RW09

23-SEP-13 07:15

Sample ID:

334065002 SOIL

Matrix: Collect Date:

Receive Date:

Collector: Moisture: Client 7.78%

25-SEP-13

Client SDG: XP0015

Project: Client ID: WCHN00213 WCHN001

V10/27/13

Parameter	Qualifier	Result	DL	RL	Units	DF Ana	alyst Date	Time Batch	Method
Semi-Volatiles-PC	СВ								
SW846 3541/808	2A PCB Solid Auto	mated Soxhlet "I	Ory Weight Corre	cted"				1313 1334323	. 1
	U	1.20	1.20	3.60	ug/kg	1 YS	09/27/13	1313 1334323	, ,
Aroclor-1016	11	1.20	1.20	3.60	ug/kg	i			
Aroclor-1221		1.20	1.20	3.60	ug/kg	1			
Aroclor-1232	U	1.20	1.20	3.60	ug/kg	1			
Aroclor-1242	U	***	1.20	3.60	ug/kg	1			
Aroclor-1248	U	1.20	1.20	3.60	ug/kg	1			
Aroclor-1254	U	1.20		3.60	ug/kg	1			
Aroclor-1260	U	1.20	1.20	3.00	ug/kg	•			
The following Pro	ep Methods were p	erformed:					- D	1-	
Method	Descriptio			Analyst	Date	Time	Prep Bate	en	
		3541 PCB Prep Soil		MXS4	09/26/13	1730	1334322		
SW846 3541									
The following A	nalytical Methods	were performed:							
Method	Description				An	alyst Comn	nents		

Method De	scription		Analyst Co	mments	
I SW	846 3541/8082A Test	Result	Nominal	Recovery%	Acceptable Limits
Surrogate/Tracer Recovery	SW846 3541/8082A PCB Solid Automated Soxhlet	5.82 ug/kg	7.21	80.7	(44%-106%)
4cmx Decachlorobiphenyl	"Dry Weight Corrected" SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.81 ug/kg	7.21	80.7	(35%-119%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

PCB Case Narrative WC-HANFORD, INC. (WCHN) SDG XP0015

Method/Analysis Information

Procedure: Analysis of Polychlorinated Biphenyls by ECD

Analytical Method: SW846 3541/8082A

Prep Method: SW846 3541

Analytical Batch Number: 1334323

Prep Batch Number: 1334322

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3541/8082A:

Sample ID	Client ID
334065001	J1RW08
334065002	J1RW09
1202955738	Method Blank (MB)
1202955739	Laboratory Control Sample (LCS)
1202955740	334065002(J1RW09) Matrix Spike (MS)
1202955741	334065002(J1RW09) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-040 REV# 20.

Raw data reports are processed and reviewed by the analyst using the Chemstation software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

Calibration Information

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

Initial Calibration

All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standards (ICV or CCV) met the acceptance criteria. All analytes were within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 334065002 (J1RW09) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recoveries for this SDG were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries for this SDG were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns. All sample extracts were cleaned using alumina. Additionally, copper was added to all sample extracts to remove sulfur.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG in this batch.

Miscellaneous Information

Electronic Package Comment

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this SDG in this batch.

Manual Integrations

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this PCB fraction.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

The front column has been chosen as the primary column. The data are reported from the front column for all samples in this batch.

Due to software issue, the surrogate recovery range was not indicated in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Aroclors quantitated on the raw data report by ChemStation data system do not necessarily represent positive Aroclor identification. In order for positive identification to be made, the Aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the Aroclor is reported as a non-detect on the data report.

System Configuration

The Semi-Volatiles-PCB analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description	
ECD9A.I_1	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 1	30m x 0.25mm, 0.25um	
ECD9A.I_2	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 2	30m x 0.25mm, 0.20um	

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Washington C	locure Hanf	ord CH	ΔΙΝ	OF CUST	ODY/S	AMP	LE ANA	LYS	S REQ	JEST	RC-23	2-051	Page	1 of 1
Collector	Josuie Hain	Compa			Tele	phone No.			Project Coord KESSNEF	nator	Price Code	8C _B	_	umaround
AJ DUNNUM			n Kes		375	-4688			SAF No.			D MAN	1-14-13:	15 Days
Project Designation 100-IU-2 & 100-IU-6 Rem	ninina Mosto Sitos	Sampl	ng Loc -373	cation			•		RC-232		1		7_	
ice Chest No.	Billing Waste Ones		ogboo	k No.	k	COA			Method of Shi		C. 1	5 /		
WCH-11-	-014	l l	1666-0			060373	32000		Commeric			CX		
Shipped To	<u> </u>	Offsite	Prope	rty No. 1170	052				Bill of Lading	'Air Bill No See		1		
GEL Laboratories, LLC				. A120	953	т			<u> </u>	1	1	T		T
Other Labs Shipped To	1				Cool 4C	Cool 4C	Cool 4C	Cool 4	c					
Λ	1/h_			Preservation								-		
1	719		Tv	pe of Container	G/P	aG	aG	аG		l				
			+	. of Container(s)	,	1	1	1						
POSSIBLE SAMPLE HA	ZARDS/REMARKS				- 	 -			_	1				
None				Volume	125mL	125mL	125mL	125m	L					
Special Handling and/or	Storage				See item (1) in	TPH-Dies								1
Cool 4C			Sa	ample Analysis	Special Instructions	Range - WTPH-D	PAHs - 8310	PC86 - 8	062					
											l			
Sample No.	Matrix	Sample Da	<u>.</u>	Sample Time	2. A.C.		A 19.15 A		12.2				: .	
J1RW08	SOIL	9-23-	7	טורט	X	×	×	У						
J1RW09	SOIL	9-23-		0715	*	×	X	V						
J1K409		1-72-	<u> </u>	0.713										
						 								
						 								
		<u> L</u>		<u> </u>	<u> </u>	l len	ECIAL INSTRI	ICTION	<u> </u>					<u></u>
CHAIN OF P		Received By/Sto		ign/Print Names	0720				tana and Licht fo	Juminum, A	Antimony, Arsenic	, Barium, Beryl	lum, Boron	Cadmium.
Relioquished By/Removed From	Date/Time 0770	ma Ba		MABAMber	9-23	2.13			t Cooper inco	lead Mann	nesium, Mangane ercury - 7471 - (C	SE MICKAROLE IN	m, Nickel, P	owssium,
Relinquished By/Removed Progr	Date/Time (624	Received By/Sto	red in	Date/Time	16:24		oneracii, osaoon,							
YN Barla MA			<u>/_</u>	eattall	9-25	-/-3			•					
Relinquished By/Removed From	U. Detertime 16:		Bir	cham DaterTime	1430								-	
Relinquished ByRemoved/From	Tall g-23.0	Received By/Sk	red In/	// Date/Time	n 14						*	/REV	IEWED	\
CIANGE BITTON	-23-13 1638	1000 B	utte	Me, toldse"	H 9-2							1	BY	$\int_{\mathcal{C}}$
Relinquished By Removed From	IA Date/Time 102	Constituted Design	red in	Chalter/Time	-								ed vida ATE	THE STATE OF THE S
1000 Cattell Ends	9-24-13 Data/Time	Received By/St	red in	9-24-13 Date/Time	1020				*			.	24.13	/
Ciling Man	9-24-13 1025	1 73	12	-X11-	clas				•					F
Relinquished By/Removed From	Date/Time	70 Pag 89/2	100	110000	HW.	2								
	tedeet	IK X	\geq	CHOF	5 <u>UU</u>	4	ΧÞ	001	5					
FINAL SAMPLE DISPOSALM DISPOSITION	lethod -	5 Dis	RUSSEC IS)	y U810.										·
WCH-EE-011														

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	В	\circ	D	E
PROJECT:	200-373		DATA PACKAG	E: YPOC	015
VALIDATOR:	ELR	LAB: Ge			zyli3
			SDG: XPC	00/5	
		ANALYSES I	PERFORMED		
SW-846 8081	SW-846 8081 (TCLP)	6W-846 8082	SW-846 8081 (TCLP)		
SAMPLES/MAT	RIX				
JIRa	ડ જ ડો	ILRWUT	,		
		,			
	ACKAGE COMPI			Έ	٥٠٠(
Technical verificat	ion documentation	present?		'E	5
Technical verificat Comments: 2. INSTRU	ion documentation	present?	LIBRATIONS (Lev	vels D and E)	Yes (No N/A
Technical verificat Comments: 2. INSTRU Initial calibrations	ion documentation	present?	LIBRATIONS (Lev	vels D and E)	Yes No N/A
Technical verificat Comments: 2. INSTRU Initial calibrations Continuing calibra	MENT PERFORM acceptable?	present?	LIBRATIONS (Le	vels D and E)	Yes No N/A
Comments: INSTRU Initial calibrations Continuing calibra Standards traceabl	MENT PERFORM acceptable?	MANCE AND CAL	LIBRATIONS (Lev	vels D and E)	Yes No N/A
2. INSTRU Initial calibrations Continuing calibra Standards traceabl Standards expired	MENT PERFORM acceptable?	MANCE AND CAL	LIBRATIONS (Le	vels D and E)	Yes No N/AYes No N/AYes No N/AYes No N/AYes No N/A
2. INSTRU Initial calibrations Continuing calibra Standards traceabl Standards expired' Calculation check	MENT PERFORM acceptable? e?	MANCE AND CAL	LIBRATIONS (Lev	vels D and E)	Yes No N/A Yes No N/A Yes No N/A Yes No N/A Yes No N/A Yes No N/A Yes No N/A

BLANKS (Levels B, C, D, and E)	
Calibration blanks analyzed? (Levels D, E)	Yes No NA
Calibration blank results acceptable? (Levels D, E)	Yes No WA
Laboratory blanks analyzed?	No N/A
Laboratory blank results acceptable?	
Field/trip blanks analyzed? (Levels C, D, E)	Yes (No) NA
Field/trip blank results acceptable? (Levels C, D, E)	Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No (N)
Comments:	No FB
4. ACCURACY (Levels C, D, and E)	Yes No N/A
Surrogates analyzed?	
Surrogate recoveries acceptable?	
Surrogates traceable? (Levels D, E)	Yes No
Surrogates expired? (Levels D, E)	Yes No N/A
MS/MSD samples analyzed?	Xos No N/A
MS/MSD results acceptable?	169 140 146
MS/MSD standards NIST traceable? (Levels D, E)	Yes No
MS/MSD standards expired? (Levels D, E)	Yes No N/A
LCS/BSS samples analyzed?	(.Yes)No N/A
LCS/BSS results acceptable?	
Standards traceable? (Levels D, E)	Yes No N/A
Standards expired? (Levels D, E)	Yes N(N)
Transcription/calculation errors? (Levels D, E)	Yes No (N/A
Performance audit sample(s) analyzed?	Yes (No) N/A
Performance audit sample results acceptable?	Yes No NA
Comments:	
	(No this

5. PRECISION (Levels C, D, and E)	
Duplicate RPD values acceptable?	(
Duplicate results acceptable?	(Yes)No N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes No NA
MS/MSD standards expired? (Levels D, E)	Yes No N/A
Field duplicate RPD values acceptable?	Yes No
Field split RPD values acceptable?	Yes No (N/A
Transcription/calculation errors? (Levels D, E)	Yes No(N/A
Comments:	
CVCTEM DEDEODMANCE (Lovels D and E)	,
6. SYSTEM PERFORMANCE (Levels D and E) Chromatographic performance acceptable?	Ves No N/A
Positive results resolved acceptably?	
Comments:	
7. HOLDING TIMES (all levels)	
Samples properly preserved?	
Sample holding times acceptable?	Yes No N/A
Comments:	$\overline{}$

8.	COMPOUND IDENTIFICATION, QUANTITATION, AND	DETECTION LIMITS (all		
levels)				
	und identification acceptable? (Levels D, E)			_
	und quantitation acceptable? (Levels D, E)			
Results	reported for all requested analyses?	(Yes	No	NA
Results	supported in the raw data? (Levels D, E)	Yes	No	
Sample	es properly prepared? (Levels D, E)	Yes	No '	NA
Detecti	on limits meet RDL?		No	N/Ą
Transci	ription/calculation errors? (Levels D, E)	Yes	Nd	N/A
Commo	ents:			_
9.	SAMPLE CLEANUP (Levels D and E)			
Fluoric	cil ® (or other absorbent) cleanup performed?	Yes	No	YN/A
Lot che	eck performed?	Yes	No	N/A
Check	recoveries acceptable?	Yes	No	N/A
GPC c	leanup performed?	Yes	No	N/A
GPC c	heck performed?	Yes	No	N/A
GPC c	heck recoveries acceptable?	Yes	No	N/A
GPC c	alibration performed?	Yes	No	N/A
GPC c	alibration check performed?	Yes	No	N/A
GPC c	calibration check retention times acceptable?	Yes	No	N/A
Check	/calibration materials traceable?	Yes	No	N/A
Check	/calibration materials Expired?	Yes	No	N/A
Analy	tical batch QC given similar cleanup?	Yes	No	N/A
Transo	cription/Calculation Errors?	Yes	No	N/A
Comm	nents:			\mathcal{L}

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC 2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: September 30, 2013

Page 1 of 2

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington

Contact:

Joan Kessner

	
Workorder:	334065

334065	Client SDG: XP0015	Project Description: RC-232 Soil

W (1 KU1 GET: 334003	Chem SDG: AT			- 00	B1-14-	RPD%	REC%	Range An	İst	Date Time
Parmname	NOM	S	ample Qual	QC	Units	KPU70	REC 76	Range An	· · ·	
Semi-Volatiles-PCB Batch 1334323										
QC1202955739 LCS Aroclor-1016	33.2			27.5	ug/kg		82.7	(39%-120%)	YSI	09/27/13 11:42
Aroclor-1260	33.2			30.5	ug/kg		91.9	(50%-116%)		
**4cmx	6.64			5.99	ug/kg		90.2	(44%-106%)		
**Decachlorobiphenyl	6.64			6.41	ug/kg		96.5	(35%-119%)		
QC1202955738 MB Aroclor-1016			U	1.11	ug/kg					09/27/13 11:31
Aroclor-1221			U	1.11	ug/kg					
Aroclor-1232			U	1.11	ug/kg					
Aroclor-1242			U	1.11	ug/kg					
Aroclor-1248			U	1.11	ug/kg					
Aroclor-1254			U	1.11	ug/kg					
Aroclor-1260			U	1.11	ug/kg					
**4cmx	6.64			4.88	ug/kg		73.5	(44%-106%)		
**Decachlorobiphenyl	6.64			5.53	ug/kg		83.2	(35%-119%)		
QC1202955740 334065002 MS Aroclor-1016	36.1	U	1.20	25.3	ug/kg		70.1	(25%-125%)		09/27/13 13:47
Aroclor-1260	36.1	U	1.20	26.5	ug/kg		73.5	(28%-127%)		
**4cmx	7.23		5.82	4.88	ug/kg		67.5	(44%-106%)		
**Decachlorobiphenyl	7.23		5.81	5.39	ug/kg		74.6	(35%-119%)		
QC1202955741 334065002 MSI Aroclor-1016	D 36.1	U	1.20	29.3	ug/kg	14.4	81.1	(0%-30%)		09/27/13 13:58

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

OC Summary

Workorder: 334065	Client SDG: XP001	5	Proj	ect Descrip	tion: RC-2	232 Soil			Page 2 of 2
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anist	Date Time
Semi-Volatiles-PCB Batch 1334323									
Aroclor-1260	36.1 U	1.20	30.2	ug/kg	12.9	83.7	(0%-30%)	İ	
**4cmx	7.22	5.82	6.10	ug/kg		84.5	(44%-106%)	YS1	09/27/13 13:58
**Decachlorobiphenyl	7.22	5.81	6.13	ug/kg		85	(35%-119%))	

Notes:

The Qualifiers in this report are defined as follows:

- The TIC is a suspected aldol-condensation product
- The analyte was detected in both the associated QC blank and in the sample. В
- Analyte has been confirmed by GC/MS analysis C
- Results are reported from a diluted aliquot of sample. D
- Concentration exceeds the calibration range of the instrument E
- The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate). Value is estimated
- Aroclor target analyte with greater than 25% difference between column analyses.
- Spike and/or spike duplicate sample recovery is outside control limits. Ţ
- Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error. U
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Х
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Z
- Analyte failed to recover within LCS limits (Organics only)

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Date:

28 October 2013

To:

Washington Closure Hanford Inc. (technical representative)

From:

ELR Consulting

Project:

100-IU-2 & 100-IU-6 Remaining Waste Sites - Soil Full Protocol - Waste Site

600-373

Subject:

Polyaromatic Hydrocarbon - Data Package No. XP0015-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0015 prepared by GEL Laboratories (GEL). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1RW08	9/23/13	Soil	С	See note 1
J1RW09	9/23/13	Soil	С	See note 1

^{1 -} Polyaromatic Hydrocarbons by 3550B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers

Appendix 2. Summary of Data Qualification

Appendix 3. Annotated Laboratory Reports

Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation

Appendix 5. Data Validation Supporting Documentation

Appendix 6. Additional Data Requested by Client

DATA QUALITY OBJECTIVES

Holding Times

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

Method Blanks

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of

compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All duplicate results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for analysis.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. XP0015 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), Data Validation Services, March 2008.

DOE/RL-96-22, Rev. 5, 100 Area Remedial Action Sampling and Analysis Plan, U.S. Department of Energy, September 2009.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH validation SOW are as follows:

- Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ Indicates presumptive evidence of a compound at an estimated value. The
 data may not be valid for some specific applications (i.e., usable for decisionmaking purposes).
- Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

Appendix 2
Summary of Data Qualification

POLYAROMATIC HYDROCARBON DATA QUALIFICATION SUMMARY*

SDG: XP0015	REVIEWER: ELR	Project: 600-373	PAGE_1_OF_1
COMMENTS: No qualifiers as	ssigned		

^{* -} The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 30, 2013

Company: Address:

WC-Hanford, Inc. 2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

8310/3550 PAH Std list Soil "Dry Weight

Corrected"

Contact:

Joan Kessner

Project:

RC-232 Soil

Client Sample ID: J1RW08 Sample ID:

334065001

Matrix:

Moisture:

SOIL

Collect Date: Receive Date: Collector:

25-SEP-13 Client

23-SEP-13 07:10

7.42%

Client SDG: XP0015

Project: Client ID:

8990

71.6

(23%-104%)

6430 ug/kg

WCHN00213 WCHN001

10/27/13

Parameter	Qualifier	Result	DL	RL	Units	DF At	nalyst Date	Time Batch	Method
HPLC-PAH									
8310/3550 PAH Std li	st Soil "Dry W	eight Corrected"							
Acenaphthene	Ū	5.39	5.39	18.0	ug/kg	1 LE	ER 09/27/13	1309 1334318	1
Acenaphthylene	U	5.39	5.39	18.0	ug/kg	1			
Anthracene	TU	1.80	1.80	18.0	ug/kg	1			
Benzo(a)anthracene		4.94	0.575	1.80	ug/kg	1			
Benzo(a)pyrene		5.26	0.575	1.80	ug/kg	ı			
Benzo(b)fluoranthene		4.47	0.575	1.80	ug/kg	1			
Benzo(ghi)perylene	U	0.575	0.575	1.80	ug/kg	1			
Benzo(k)fluoranthene	υ	0.288	0.288	0.899	ug/kg	I			
Chrysene		5.74	0.575	1.80	ug/kg	1			
Dibenzo(a,h)anthracene	U	0.575	0.575	1.80	ug/kg	ì			
Fluoranthene		6.93	0.575	1.80	ug/kg	1			
Fluorene	U	5.39	5.39	18.0	ug/kg	1			
Indeno(1,2,3-cd)pyrene	U	0.575	0.575	1.80	ug/kg	1			
Naphthalene	U	5.39	5.39	18.0	ug/kg	1			
Phenanthrene	U	5.39	5.39	18.0	ug/kg	1			
Pyrene		7.87	0.575	1.80	ug/kg	1			
The following Prep M	lethods were p	erformed:							
Method	Descriptio			Analyst	Date	Time	Prep Batcl	1	
SW846 3550B	3550B PAH	BY HPLC Prep in soil		AXVI	09/26/13	1642	1334317		
The following Analy	tical Methods	were performed:							
Method	Description	n			Ar	alyst Com	ments		
1	SW846 8310								
Surrogate/Tracer Rec	overy Test			F	Result No	ominal I	Recovery%	Acceptable I	Limits

Notes:

Decafluorobiphenyl

Page 17 of 82

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: September 30, 2013

Company:

WC-Hanford, Inc.

Address:

2620 Fermi Avenue

MSIN H4-21

Richland, Washington 99354

Contact:

Joan Kessner

Project:

RC-232 Soil

Client SDG: XP0015

Project:

Client ID:

Client Sample ID: J1RW09

Sample ID:

334065002

Matrix:

SOIL

Collect Date:

23-SEP-13 07:15

Receive Date:

25-SEP-13 Client

Collector: Moisture:

7.78%

V,01276.7

WCHN00213

WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
HPLC-PAH										
8310/3550 PAH Std li	st Soil "Dry W	eight Corrected"								
Acenaphthene	Ū	5.41	5.41	18.0	ug/kg	ı	LER 09	7/27/13	1516 1334318	1
Acenaphthylene	U	5.41	5.41	18.0	ug/kg	ı				
Anthracene	TU	1.80	1.80	18.0	ug/kg	1				
Benzo(a)anthracene		18.7	0.577	1.80	ug/kg	1				
Benzo(a)pyrene		15.4	0.577	1.80	ug/kg	1				
Benzo(b)fluoranthene		12.3	0.577	1.80	ug/kg	1				
Benzo(ghi)perylene		10.1	0.577	1.80	ug/kg	1				
Benzo(k)fluoranthene	U	0.288	0.288	0.901	ug/kg	1				
Chrysene		20.3	0.577	1,80	ug/kg	1				
Dibenzo(a,h)anthracene	J	1.05	0.577	1.80	ug/kg	1				
Fluoranthene		24.9	0.577	1.80	ug/kg	1				
Fluorene	υ	5,41	5.41	18.0	ug/kg	i				
Indeno(1,2,3-cd)pyrene	U	0.577	0.577	1.80	ug/kg	1				
Naphthalene	U	5.41	5.41	18.0	ug/kg	1				
Phenanthrene		24.1	5.41	18.0	ug/kg	1				
Pyrene		32.8	0.577	1.80	ug/kg	1				
The following Prep M	ethods were p	erformed:								
Method	Description	n		Analyst	Date	Time	е Ргеј	Batch	1	
SW846 3550B	3550B PAH	BY HPLC Prep in soil	,	AXVI	09/26/13	1642	1334	317		

The following Ana	lytical Methods	were performed:

Method Description			Analyst Co	mments	,
ı sw	846 8310				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	6380 ug/kg	9010	70.9	(23%-104%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

HPLC-PAH WC-HANFORD, INC. (WCHN) SDG XP0015

Method/Analysis Information

Procedure:

Polynuclear Aromatic Hydrocarbons

Analytical Method:

SW846 8310

Prep Method:

SW846 3550B

Analytical Batch Number: 1334318

Prep Batch Number:

1334317

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8310:

Sample ID	Client ID
334065001	J1RW08
334065002	J1RW09
1202955729	Method Blank (MB)
1202955730	Laboratory Control Sample (LCS)
1202955731	334065001(J1RW08) Matrix Spike (MS)
1202955732	334065001(J1RW08) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

Preparation/Analytical Method Verification

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP).

The data discussed in this narrative has been analyzed in accordance with GL-OA-E-030 REV# 15.

Raw data reports are processed and reviewed by the analyst using the Target software package. False positives have been removed from the Target quantitation reports per standard operating procedures (SOP) section 18.0.

Calibration Information

Due to software limitations, the files displayed at the beginning of the Form 6 are only the last files uploaded for each individual level. A complete listing of all files used in the current ICAL are shown on the Calibration History that is included with each Level 4 or higher package. The last file by date in each level is the one currently uploaded for that level.

The linear equation used in Target and indicated on the initial calibration summary form is not a conventional linear equation (slope intercept formula) and does not match the equation found in SW-846 method 8000B. The x and y axes are inversed in Target, so that the instrument response is treated as the independent variable (x) and the concentration ratio is treated as the dependent variable (y). The equation used in Target to calculate sample results is adjusted to account for the linear equation inversion and reciprocal slope. The adjusted calculation has been independently verified to produce valid results.

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All associated calibration verification standards (ICV or CCV) met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

OC Sample Designation

Sample 334065001 (J1RW08) was chosen for matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS (1202955731) did not meet acceptance criteria for the recovery of Anthracene at 91.4%. The limits are 49-91%. Since the recovery was biased high and Anthracene was not detected in the parent sample, 334065001 (J1RW08), the data are considered unaffected. The LCS (1202955730) met acceptance criteria for all target analytes. The data are "T" qualified and reported with the appropriate DER.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPDs between the MS and MSD met the acceptance limits.

Technical Information:

Holding Time Specifications

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information:

Data Exception (DER) Documentation

Data Exception Report 1226519 was generated for this SDG.

The MS (1202955731) did not meet acceptance criteria for the recovery of Anthracene at 91.4%. The limits are 49-91%. Since the recovery was biased high and Anthracene was not detected in the parent sample, 334065001 (J1RW08), the data are considered unaffected. The LCS (1202955730) met acceptance criteria for all target analytes. The data are "T" qualified and reported with the appropriate DER.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

Additional Comments

The Form 8 is used only as a sequence of the analysis.

Electronic Package Comment

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data and package. The data validator will always sign and date the case narrative.

Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for Polynuclear Aromatic Hydrocarbons analyses.

The chromatographic hardware system consists of a HP Model 1100 HPLC with programmable gradient pumping and a 100 uL loop injector.

The HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitors absorbance at the following five wavelengths: 1) 224 nm; 2) 250 nm; 3) 270 nm; 4) 234 nm; 5) 300 nm.

The HPLC 1100 is also coupled to a HP Model G1321A Fluorescence Detector in series which monitors the following varying excitations and emissions 1) EX 230 nm EM 330 nm; 2) EX 210 nm EM 314 nm; 3) EX 250 nm EM 368 nm; 4) EX 237 nm EM 440 nm; 5) EX 277 nm EM 376 nm; 6) EX 255 nm EM 420 nm; 7) EX 230 nm EM 453 nm.

The Diode Array UV detector is used as the primary detector and the Fluorescence Detector is used as the confirmation detector. All results are reported from the primary Diode Array UV detector.

The HPLC system is identified with a designation of HPLC E in the raw data printouts.

Chromatographic Columns

Chromatographic separation of Polynuclear Aromatic Hydrocarbons is accomplished through analysis on the following reversed phase columns:

Phenomenex: Luna C18 (2), 100 A, 250 mm x 4.6 mm containing 5 um size particle.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DER Report No.: 1226519

Revision No.: 1

	DATA EXC	EPTION REPORT	
Mo.Day Yr. 80-SEP-13	Division: Industrial	Quality Criteria: Specifications	Type: Process
nstrument Type: .C-MS/MS	Test / Method: SW846 8310	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1334318	Sample Numbers: 1202955731		
Application Issues: Failed Recovery for MS/PS	der(s)(SDG): 334065(XP0015)		
Specification and Requirem Exception Description:	ents	DER Disposition:	
1. The MS (1202955731) did recovery of Anthracene at 91	d not meet acceptance criteria for the 1.4%. The limits are 49-91%.	the parent sample, 3340650 unaffected. The LCS (1202)	piased high and Anthracene was not detected 001 (J1RW08), the data are considered 955730) met acceptance criteria for all target qualified and reported with the appropriate of the Case Narrative.

30-SEP-13

Originator's Name:

Lynne Russell

Data Validator/Group Leader:

Michael Penny

30-SEP-13

	1	and CHA	INIC	OF CUST	ODYIS	ΔN	IPI I	EANA	LYS	IS	REQUE	EST		RC-23		Pag	e 1 of 1
Washington C	iosure Hanto		y Conti		Tele	phone	No.			[Pro	Mect Coolains	ו ייטו	Price C	ode	8C _B	_	Turnaround
AJ Dunnum			Kessne		375	4688				1	KESSNER, J	Н			5 ,	A-19-1	ो 15 Days
Project Designation		1 .	g Locati	ion.							F No. RC-232	`				7	15 Days
100-IU-2 & 100-IU-6 Rema	ining Waste Sites	600-				OA				1	thod of Shipm	ent					
Ice Chest No.	all		igbook N 1666-01				37320	000			Commerical	Carrier	-+1	ed	$\mathcal{L}X$		
WCH-11-	019		Property	. No	~~~					Bil	I of Lading/Air		1	SP	1		
GEL Laboratories, LLC				A120	<u>953</u>					上	т т	See		<u>J F</u>	<u> </u>	1	
Other Labs Shipped To	1				Cool 4C	· c~	ol 4C	Cool 4C	Cool 4	4C			İ				
\	/n		Pr	reservation	C001-10										ļ		_
14	H		Tuna	of Container	G/P		aG	aG	aG								
			 			 						<u></u>					
POSSIBLE SAMPLE HAZ	ARDS/REMARKS		No. o	f Container(s)	1	-	1	1	1		┼						
None				Volume	125mL	12	5mL	125mL	1250	nL					<u> </u>		
																	
Special Handling and/or	Storage		ĺ	•	See item (1) in		-Diesei									1	
Cool 4C			Sam	pie Analysis	Special Instructions	Ra	nge - PH-D +	PAHs - 8310	PC8s -	8082						İ	
						•					1						
Comple No	Matrix	Sample Date	-	Sample Time								1.				1:	
Sample No.		-		0710	X	×		×	Y								
J1RW08	SOIL	9-23-1				1	×	×	V								
J1RW09	SOIL	9-23-1	3 -	0715	*	+	X.	 ^ _	l 🖰								
					 	┼		 			+		$\neg \uparrow \neg$				
						┼		╂	 						1		
					<u> </u>		loose	NAL INCTES	ICTION	NS.					1		
CHAIN OF PO		Received By/Store		n/Print Names	0720	1		CIAL INSTRU		_	e-out List) (Alun	ninum, A	ntimony,	Arsenic,	Barium, Be	ryllium. Bor	on, Cadmium.
Religouished By/Removed From	A Date/Time 0770				1 9.3	2.13					e-out List) (Alun opper, Iron, Lea um, Vanadium, I						, 1 0233000
Relinquished By/Removed Frog	9-25-13 Date/Time (624	Received By/Store		MA BAMMEN		<u>۔ ب</u>	Sere	man, Shoon,	CHIVEL, C		•						
List of	Companyer 9-23.	13 CHARMAC	L	ENHall	9-25	-13	1										
Relinquished By/Removed From	/ Defertime 16:3	O Chinara	****	ham Date/Time	11,3	2									_		
Charltall (Al)	all 9-23-2	Received By/Stor	ed In/	9-23-13 DeterTime		38	1								/ RE	VIEWE	5
Cing Brava	-23-13 1438	1000 BO	ttel	te, fordse	4 9-2	<u>3-13</u>	4								1 Kin	ood VI	acmil
Reinquished Byrrymoved From 1000 Prattell Frack	14 Date/Time 1021	CIMA	, (9-24-13	1020											DATE -24-1	, <i>I</i>
	Date/Time 3-24-/3 1025	Received By/Sfor	ed in	Date/Time	···lac		1				•			•	1		
Relinquished By/Removed From	Date/Time	TO BY		(1) X	ET CA	30				4 ~	•						
EINAL SAMPLE Disposai Me	teast	Disp	osed By	Date	/Time		1	XP	00	15)						
DISPOSITION							<u> </u>										
WCH-EE-011																	

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	В	c	D	Е				
PROJECT:	600-373		DATA PACKAG	e: X 000	15,				
VALIDATOR:	ELR	LAB:		DATE: /o/	22/13				
			SDG:	100015					
		ANALYSES	PERFORMED						
8015	8021	8141	8151	8315	8310)				
		WTPH-HCID	WTPH-G	WTPH-D					
SAMPLES/MA	TRIX:								
		12W07							
Jie	308 3	(1000)							
	PACKAGE COMP				Sol (
rechnical verific	PACKAGE COMP ation documentation	present?							
Technical verific Comments: 2. INSTR	ation documentation	a present?	FION (Levels D and	I E)					
Comments: 2. INSTR Initial calibration	umentation UMENT TUNING acceptable?	AND CALIBRAT	TION (Levels D and	l E)					
Comments: INSTR Initial calibration Continuing calib	UMENT TUNING as acceptable?	AND CALIBRAT	TION (Levels D and	1 E)	Yes No N				
Comments: INSTR Initial calibration Continuing calib	UMENT TUNING ns acceptable?	AND CALIBRAT	TION (Levels D and	l E)	Yes No NYes No NYes No N				
2. INSTR Initial calibration Continuing calib Standards tracea	UMENT TUNING as acceptable?	AND CALIBRAT	FION (Levels D and	I E)	Yes No NYes No NYes No NYes No NYes No N				

•	D, and E)	
Calibration blanks analyzed? (Lev	vels D, E)	Yes No
Calibration blank results acceptab	ole? (Levels D, E)	Yes No N/A
Laboratory blanks analyzed?		Yes No N/A
Laboratory blank results acceptab	ole?	
		Yes (No)XA
		Yes No (N/A
Transcription/calculation errors?	(Levels D, E)	Yes No N/A
Comments:		No FB
4. ACCURACY (Levels (C, D, and E)	
• •	ompounds analyzed?	/ 🔾
	mpound recoveries acceptable?	
Surrogates traceable? (Levels D,	, E)	
Surrogates expired? (Levels D, E	3)	
MS/MSD samples analyzed?		
MS/MSD results acceptable?		
MS/MSD standards NIST tracea	able? (Levels D, E)	Ÿes No N
MS/MSD standards expired? (Le	evels D, E)	Yes No N/
LCS/BSS samples analyzed?		
LCS/BSS results acceptable?		
		Yes No N
		Yes No (N
		Yes No (N/
Performance audit sample(s) and		Ye No N
	ts acceptable?	Yes No W
		no PAS

PRECISION (Levels C, D, and E)	
cate RPD values acceptable?	No N/A
cate results acceptable?	Yes) No N/A
ISD standards NIST traceable? (Levels D, E)	Yes INCLINATION
ASD standards expired? (Levels D, E)	Yes No 1949
dunlicate RPD values acceptable?	Yes No No
split RPD values acceptable?	Yes No (1974)
scription/calculation errors? (Levels D, E)	Yes No NA
ments:	
	0-
HOLDING TIMES (all levels)	Vac No. N/A
ples properly preserved?	Ves No N/A
ple holding times acceptable?	
nments:	
S 1	cate RPD values acceptable?

8. COMPOUND IDENTIFICATION, QUANTITIATION, AND DI	STECTION LIMITS (an
levels)	
Results reported for all requested analyses?	
Results supported in the raw data? (Levels D, E)	
Samples properly prepared? (Levels D, E)	
Detection limits meet RDL?	
Transcription/calculation errors? (Levels D, E)	Yes N6 N/A
Comments:	
9. SAMPLE CLEANUP (Levels D and E)	\sim
Fluoricil ® (or other aborbant) cleanup performed?	Yes No N/A
Lot check performed?	
Check recoveries aceptable?	
Check materials traceable?	
Check materials Expired?	Yes No N/A
Analytical batch QC given similar cleanup?	
Transcription/Calculation Errors?	
Comments:	

Appendix 6 Additional Documentation Requested by Client

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: September 30, 2013

Page 1 of 4

WC-Hanford, Inc. 2620 Fermi Avenue MSIN H4-21 Richland, Washington Joan Kessner

Contact:

Workorder: 334065	Client SDG: XP001:	Client SDG: XP0015 Project Description: RC-232 Soil										
Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time		
HPLC-PAH Batch 1334318												
QC1202955730 LCS Acenaphthene	1670		1390	ug/kg		83.6	(58%-99%)	LER	09/27/	13 12:27		
Acenaphthylene	1670		1380	ug/kg		83	(58%-98%))				
Anthracene	1670		1510	ug/kg		90.6	(63%-94%))				
Benzo(a)anthracene	167		152	ug/kg		91	(73%-98%))				
Benzo(a)pyrene	167		144	ug/kg		86.4	(63%-99%)				
Benzo(b)fluoranthene	167		146	ug/kg		87.7	(70%-130%)				
Benzo(ghi)perylene	167		145	ug/kg		87.1	(70%-130%)				
Benzo(k)fluoranthene	83.3		69.0	ug/kg		82.9	(70%-130%)				
Chrysene	167		167	ug/kg		100	(70%-130%)				
Dibenzo(a,h)anthracene	167		170	ug/kg		102	(70%-130%)				
Fluoranthene	167		139	ug/kg		83.6	(70%-130%)				
Fluorene	1670		1420	ug/kg		85.3	(65%-130%	o)				
Indeno(1,2,3-cd)pyrene	167		156	ug/kg		93.4	(70%-130%	5)				
Naphthalene	1670		1350	ug/kg		80.9	(57%-130%	5)				
Phenanthrene	1670		1410	ug/kg		84.8	(70%-130%	b)				
Pyrene	167		150	ug/kg		90.3	(70%-130%	ó)				
**Decafluorobiphenyl	8330		7050	ug/kg	;	84.7	(23%-104%	ó)				
QC1202955729 MB Acenaphthene		U	4.99	ug/kg	:		ι		09/27	/ /13 11:4		
Acenaphthylene		U	4.99	ug/kg	;					*		

GEL LABORATORIES LLC 2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 334065	Client SDG: XP0015 Project Description: RC-232 Soil										Page 2 of 4		
	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time	
Parmname	NOM		Sample										
HPLC-PAH Baich 1334318													
Anthracene				U	1.66	ug/kg							
				U	0.532	ug/kg				LER	09/27/	13 11:45	
Benzo(a)anthracene				J									
Benzo(a)pyrene				U	0.532	ug/kg							
D (I) (I)				U	0.532	ug/kg							
Benzo(b)fluoranthene													
Benzo(ghi)perylene				U	0.532	ug/kg							
Benzo(k)fluoranthene				U	0.266	ug/kg							
Delizo(k)Hdoranmeno					0.573	ua/ka							
Chrysene				U	0.532	ug/kg							
Dibenzo(a,h)anthracene				U	0.532	ug/kg	;						
				U	0.532	ug/kg	,						
Fluoranthene				U	0.552	~ ₆ , ~ ₆	,						
Fluorene				U ·	4.99	ug/kg	3						
				U	0.532	ug/kg	g						
Indeno(1,2,3-cd)pyrene													
Naphthalene				U	4.99	ug/kį	g						
Phenanthrene				U	4.99	ug/k	g						
Pnenanthrene						a							
Pyrene				U	0.532	ug/k	g						
**Decafluorobiphenyl	8320				6410	ug/k	g	77	(23%-104	!%)			
QC1202955731 334065001 MS Acenaphthene	S 1800	U	5.	39	1440	ug/k	g	79.9	(49%-90)%)	09/2	27/13 13:	
Acenaphulene								79.6	(48%-9	7%)			
Acenaphthylene	1800	U	5	.39	1430	ug/k	cg	73.0	(4070-2	, , , ,			
Anthracene	1800	TU	1	.80 T	1640	ug/k	(g	91.4*	(49%-9	1%)			
					163	ug/l	k a	87.9	(29%-12	6%)			
Benzo(a)anthracene	180		4	.94	103	ug/i	~ 8	07.7	-				
Benzo(a)pyrene	180		5	.26	159) ug/l	kg	85.7	(26%-13	0%)			
	100		A	.47	150	5 ug/l	kg	84.4	(32%-13	5%)			
Benzo(b)fluoranthene	180		4	', ''	130								
Benzo(ghi)perylene	180	U	0.	575	15:	5 ug/1	kg	86.1	(34%-12	5%)			
Benzo(gni)perylene		•											

GEL LABORATORIES LLC
2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 334065	Client SDG: XP0015			Projec	t Descripti		Page 3 of 4				
Parmname	NOM		Sample Qual	QC	Units	RPD%	REC%	Range Anis	<u>t</u>	Date Time	<u>c</u>
HPLC-PAH Batch 1334318											
Benzo(k)fluoranthene	89.9	U	0.288	75.4	ug/kg		83.9	(48%-142%) L	ER	09/27/13 13	:51
Chrysene	180		5.74	180	ug/kg		96.9	(39%-127%)			
Dibenzo(a,h)anthracene	180	U	0.575	180	ug/kg		100	(38%-130%)			
Fluoranthene	180		6.93	154	ug/kg		81.9	(20%-139%)			
Fluorene	1800	U	5.39	1510	ug/kg		83.8	(51%-90%)			
Indeno(1,2,3-cd)pyrene	180	U	0.575	169	ug/kg		94	(41%-145%)			
Naphthalene	1800	U	5.39	1300	ug/kg		72.3	(43%-87%)			
Phenanthrene	1800	U	5.39	1530	ug/kg		85	(50%-100%)			
Pyrene	180		7.87	168	ug/kg		89.3	(18%-149%)			
**Decafluorobiphenyl	8990		6430	6780	ug/kg		75.4	(23%-104%)			
QC1202955732 334065001 MS Acenaphthene	SD 1790	U	5.39	1420	ug/kg	1.50	79	(0%-30%)		09/27/13 1	14:33
Acenaphthylene	1790	U	5.39	1410	ug/kg	1.62	78.6	(0%-30%)			
Anthracene	1790	TU	1.80	1620	ug/kg	1.31	90.5	(0%-30%)			
Benzo(a)anthracene	179		4.94	165	ug/kg	1.37	89.4	(0%-30%)			
Benzo(a)pyrene	179		5.26	161	ug/kg		86.7	(0%-30%)			
Benzo(b)fluoranthene	179		4.47	159	ug/kg	1.52	85.9	(0%-30%)			
Benzo(ghi)perylene	179	U	0.575	156	ug/kg		87.3	(0%-30%)			
Benzo(k)fluoranthene	89.6	U	0.288	77.1	ug/kg		86	(0%-30%)			
Chrysene	- 179		5.74	179	ug/kg			(0%-30%)			
Dibenzo(a,h)anthracene	179	U	0.575	179	ug/kį						
Fluoranthene	179		6.93	158	ug/kį	g 2.43	84.3	(0%-30%)			

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

OC Summary

Workorder: 334065	Client SDG:	Project Description: RC-232 Soil					Page 4 of 4				
			Sample Qual	QC	Units	RPD%	REC%	Range A	nlst	Date	Time
1334318											
	1790	U	5.39	1480	ug/kg	1.60	82.7	(0%-30%)	LER	09/27/	13 14:33
cd)pyrene	179	U	0.575	167	ug/kg	1.44	92.9	(0%-30%)			
	1790	U	5.39	1270	ug/kg	2.62	70.6	(0%-30%)			
i.	1790	U	5.39	1510	ug/kg	1.02	84.4	(0%-30%)			
	179		7.87	173	ug/kg	2.92	92.4	(0%-30%)			
phenyl	8960		6430	6670	ug/kg		74.4	(23%-104%)			
	1334318 cd)pyrene	NOM 1334318 1790 1790 1790 1790 1790	NOM 1334318 1790 U 1790 U 1790 U 1790 U 1790 U	1334065 Client SDG: XP0015 NOM Sample Qual	NOM Sample Qual QC 1334318 1790 U 5.39 1480 cd)pyrene 179 U 0.575 167 1790 U 5.39 1270 1790 U 5.39 1510 179 7.87 173	NOM Sample Qual QC Units	NOM Sample Qual QC Units RPD%	NOM Sample Qual QC Units RPD% REC%	NOM Sample Qual QC Units RPD% REC% Range A	1790 U 5.39 1480 ug/kg 1.60 82.7 (0%-30%) 1790 U 5.39 1270 ug/kg 2.62 70.6 (0%-30%) 1790 U 5.39 1510 ug/kg 1.02 84.4 (0%-30%) 1790 U 5.39 1510 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 ug/kg 2.92 92.4 (0%-30%) 1790 U 5.39 1790 U	NOM Sample Qual QC Units RPD% REC% Range Anist Date

Notes:

The Qualifiers in this report are defined as follows:

- The TIC is a suspected aldol-condensation product Α
- The analyte was detected in both the associated QC blank and in the sample. В
- Analyte has been confirmed by GC/MS analysis C
- Results are reported from a diluted aliquot of sample. D
- Concentration exceeds the calibration range of the instrument E
- The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as J appropriate). Value is estimated
- Aroclor target analyte with greater than 25% difference between column analyses.
- Spike and/or spike duplicate sample recovery is outside control limits. Т
- Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier х
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Y
- Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier Z
- Analyte failed to recover within LCS limits (Organics only) 0

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

- ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
- * Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.